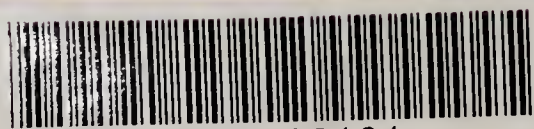


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GHANA MEDICAL FIELD UNITS  
ANNUAL REPORT  
1959.

David Scott.





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GHANA MEDICAL FIELD UNITS

ANNUAL REPORT FOR 1959.

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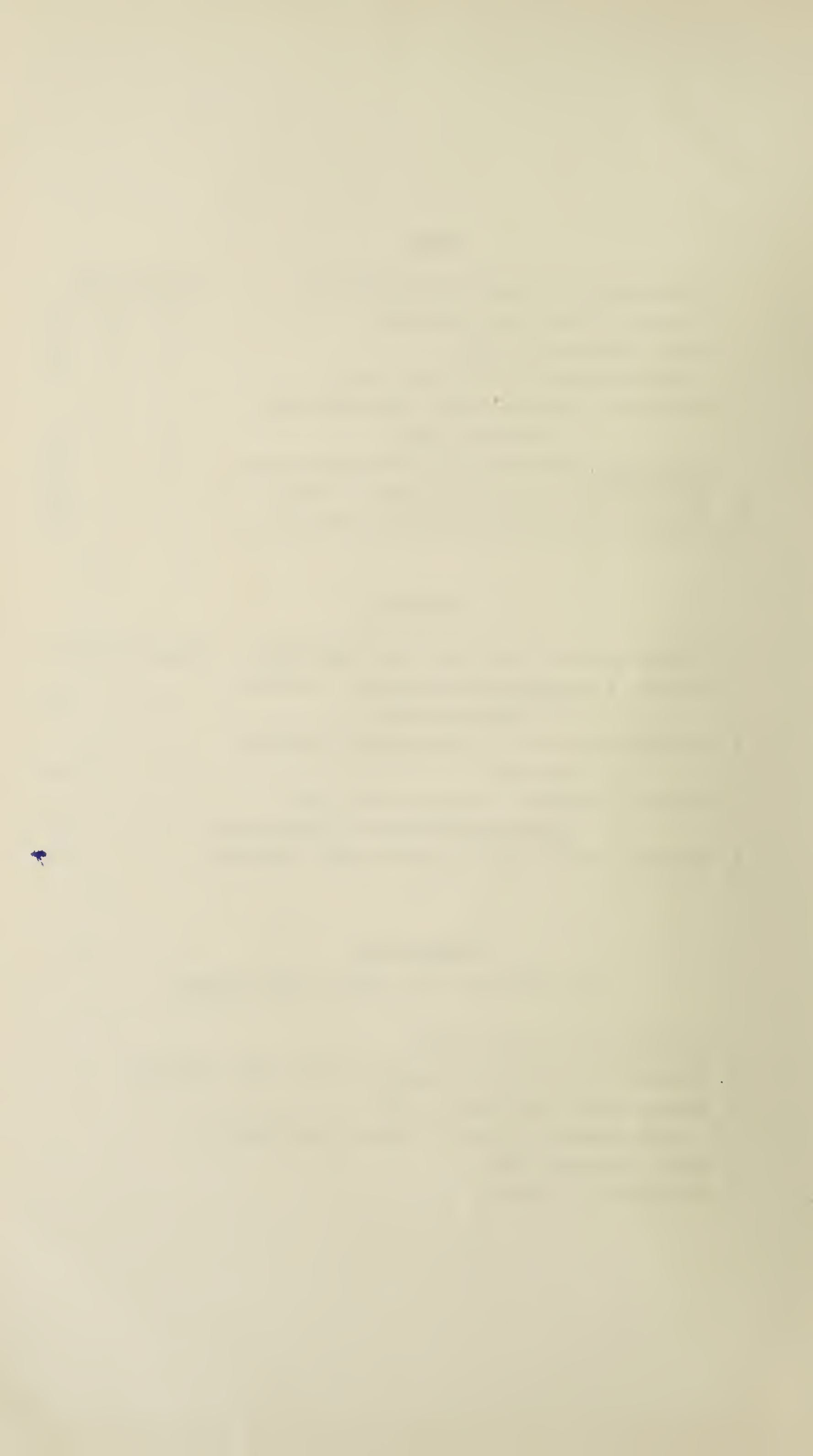
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GHANA MEDICAL FIELD UNITS  
ANNUAL REPORT 1959

Introduction to the Report.

The aims of this Annual Report, and the manner in which the document is presented are much as they have been in recent years. For the benefit of new readers, however, it is probably desirable to indicate very briefly the more important principles which have governed its preparation.

The bare need of the Annual Report is to provide a record of the year's work, but this would hardly be comprehensible were it not supported by much explanatory commentary which, indeed, forms its bulk. But in providing the commentary there lie several dangers not least being the risk of tediousness created by the yearly near-repetition of much that is fundamental to an intelligent appreciation of M.F.U. which, being necessary for those who have previously had little contact with this type of work, cannot properly be excluded.

The overriding consideration has been to try to make the Report as readable and as interesting as possible. In this way it can serve a wider purpose than the customary factual record of the year's work required by authority. Broadly speaking there are two groups of people who might read these Reports. The first and largest group are persons in Ghana whose interest may range from the general to the specialised, the layman concerned with the development of the country or the professional person searching for particular information. The second group is small but important and comprises those who are concerned with the problems of endemic and epidemic disease over a wide front, and in particular those who in the course of their work visit Ghana, the international advisor and consultant or perhaps colleagues from other countries, but who may not have sufficient time to gain first hand experience of the situation obtaining here within the fields of their interest. To these persons it is hoped that this Annual Report will be specially useful for an endeavour is made to provide in a single document a comprehensive and up to





date statement relating to endemic and epidemic disease investigation and control in Ghana, and to give this against a background of the broad purposes and functions of M.F.U.

Other factors also influence its form. In M.F.U. there are eight separate units together with a number of active divisions in headquarters, each submits its own full annual report and manifestly the parent document cannot report all the activities or contain all the records and observations on the year's work which are received, much has to be omitted. Furthermore, the report of the year's work should be provided in such a manner as to satisfy the requirements not only of those who use it in the early months of 1960 but also those who may turn to it after an interval of several years; and finally, it is constantly borne in mind that the value of the observations on endemic and epidemic disease made in a particular year are enhanced where they are seen as a progression from previous years. Thus a certain amount of detail relating to 1959 is discarded and, at the risk of repetition, use is made of records and observations of former years in order to mark out the trends as clearly as possible, for the observations of the year should not be seen in isolation but must be considered in the light of previously known facts. This necessary interweaving of impressions and observations of several years does not obscure the picture of the work actually performed in 1959 for it is made clear in the text which facts and figures relate to the year under review and at the end of the Report the year's achievements in terms of disease investigation and control are summarised factually as far as this is possible.

The Report is divided into two parts. The second is concerned wholly with the scientific and technical aspects of the work. Part I covers general subjects, administration and the like and, in order to cater for those who do not wish to read through the whole of the Report, it includes also brief summaries of the work of the separate Units and provides a rapid sketch of the principle medical features, problems and progresses of the organisation as a whole during 1959.



Part I

The aims and objectives of Medical Field Units

Medical Field Units is constantly undergoing changes, which, hardly perceptible from one year to the next are in accord with a long term process of evolution, for it is essential that the organisation should be adapted as far as possible to the changing conditions in the fields of endemic and epidemic disease investigation and control. In order that the aims and objectives of M.F.U. can be appreciated and, more important, that its limitations be understood it is useful to restate briefly the steps by which it has reached its present state of development.

(a) The past

In the early 1930s an epidemic of human trypanosomiasis broke out in Northern Ghana, being part of a pandemic of the disease which was moving across the western part of tropical Africa. In response to this an ad hoc organisation was created to carry out large scale surveys for the disease in the worst areas and to give mass treatment to the cases thus discovered. The Trypanosomiasis Campaign as it was called was formed in Gambaga and comprised about 20 men who were, for the most part, locally recruited in Mamprussi. They were trained in the elementary microscopy, in the simple record keeping and in the census taking that mass control of trypanosomiasis demands; moreover they were accustomed to hard living under bush conditions and knew the value of good public relations. By 1950 the epidemic of trypanosomiasis had waned and the future of the organisation then came up for review. It was particularly fortunate that it did so at a time when many factors were determining that initial steps should be taken to deal with the great load of parasitic disease borne by the people of the country. Such factors were the growing public realisation that much of the disease could be prevented, the consequent demands for control, the increasing range of the medical armamentarium, antibiotics, sulphones and insecticides, an economic boom and the general progress associated with a post-war period.





It was clear that the Trypanosomiasis Campaign might be shaped to provide a useful weapon in this work and development of the organisation rather than relegation was required. Thus, in step with events in neighbouring countries, Ghana converted her sleeping sickness service into a general endemic/epidemic diseases investigation and control unit with the gradual emergence of the present day M.F.U. But the process whereby an organisation concerned with the single task of discovering cases of human trypanosomiasis is converted into fact finding Units of some complexity is long indeed, and even after the change in principle from unipurpose to multipurpose units has been effected this in turn is succeeded by the evolutionary development of the new techniques.

(b) The present

Although change is a marked feature of the work of M.F.U. the objectives remain, for the time being, much as they have been in recent years; efforts are in five principal directions, first declared in the Annual Report of 1955, which might be considered to be M.F.U.'s terms of reference, they are:-

- (1) The conduct of surveys for endemic disease in Ghana.
- (2) The study of endemic and epidemic disease; the epidemiological interpretation of the data collected on the surveys in such a manner as to provide a sound foundation on which to base mass campaigns against the individual infections.
- (3) The conduct of mass campaigns directed against endemic and epidemic disease on lines already accepted by expert medical opinion.
- (4) The conduct of investigations, on a limited scale, into different means of mass control either where there is no generally accepted policy or where the problems presented by a particular disease in Ghana are unique.
- (5) To carry out such other measures as are necessary to ensure the efficient pursuit of the major objectives.



Put in another way it might be said that the aim is towards a greater control of endemic and epidemic disease by any sound means which can be applied en masse. It is perhaps necessary to point out that, for the time being at least, M.F.U. is not in any way concerned with disease other than with some of the more common transmissible parasitic infections, but this provides a potentially enormous field, by far the greatest in tropical Africa.

Not infrequently it is thought that M.F.U. is a research organisation but this is not so if research implies experiments performed in laboratories. That is not at present a function of M.F.U.; there are other bodies better equipped in all respects to do this type of work. The duty of M.F.U. is to discover what are the problems of endemic and epidemic disease in Ghana, based on the interpretation of field survey findings which must be seen in the light of field experience, and then to apply means of dealing with them that have been proved by experts in these fields to be the best available. If however, the term research can be used to cover field investigations which require little equipment and are designed to elucidate further the observations and impressions gained whilst in the field then, indeed, M.F.U. can be regarded as a research Unit. The results of such investigations may not lead to any dramatic discovery but it is bound to result in a better understanding and consequently lead to more effective control of particular diseases.

In effect M.F.U. performs a dual function. The first is the control of endemic and epidemic disease by the application of standard procedures for example, the present countrywide campaign against yaws by mass injection of penicillin; the prevention of smallpox, and in certain circumstances yellow fever, by vaccination; the control of sleeping sickness by mass attack on the reservoir of infection and sometimes by mass drug prophylaxis, the control of this disease and of onchocerciasis by destruction of the respective insect vectors of these infections; the control of the annual epidemic of meningitis. This work is readily understood by anyone, medical





and lay alike. The second purpose is by no means widely appreciated, it is the collection and assessment of facts and figures relating to endemic disease throughout the country. It is not surprising that this work should hold little interest for the layman for it has none of the drama associated with epidemics or with mass disease control, what is strange is that it has remarkably little appeal to medical persons except those with a well developed public health outlook. In the Units generally these statistical and epidemiological aspects of the work are very much in the second place, but this is understandable where there is a considerable turn over in medical staff for time is required to achieve the proper outlook. However it can be said that more and more attention is being given annually in M.F.U. Headquarters to these very important matters, and the Units themselves are experiencing the beginnings of the same process which must, inevitably, be gradual.

(c) The future

The control of those communicable diseases now being attacked by mass measures will, it is expected, be sufficiently successful to necessitate, as a long term means of control, no more than relatively infrequent and selective attacks on the remaining and persistent foci of infection. Even when new advances in therapeutics provide a means of drug control of some of the other infections at present not being dealt with, such as bilharziasis and onchocerciasis, which would keep M.F.U. staff very busy for some time these diseases would, no doubt, ultimately be brought to the reduced state now being suffered both by yaws and trypanosomiasis. Mass attack is only the first stage towards endemic disease control and it is certainly the easiest in the sense that it is the most rewarding. If M.F.U. is to play its full part in this work it is essential to look beyond the present phase to the future to ensure that the organisation is prepared as well as it may be for the next step.

/7.....



Furthermore mass surveys for the purpose of assessment and epidemiological appraisal should be done once and once only in any area so that even more than in the case of the application of mass control measures they are the work of a relatively short period in the life of M.F.U.

In the future, perhaps after little more than another decade, lies the day when the possibilities derived from large teams carrying out survey and control have been exhausted and by that time the finer techniques of investigation and control must have already been gradually introduced. It is inevitable that control measures will be intensified and applied more selectively, possible examples being the notification of cases of infectious yaws or in the attacks on the vectors of infections such as bilharziasis, onchocerciasis and trypanosomiasis being carefully restricted to only the important localities of transmission, which have yet to be pinpointed. In this process M.F.U. is bound to become more static, perhaps operating on a sub-district basis, teams will become smaller and more ad hoc in nature. The relationship that will develop between such a future service of M.F.U. and the system of Health Centres now being built up throughout the country is problematic, it is bound to be a close association.

Another possible development of M.F.U. in the future is in laboratory research into many of the problems associated with endemic and epidemic disease. Granted there is much work to do in these fields it is nevertheless evident that evolution in this direction will be relatively restricted; neither by tradition nor experience is M.F.U. particularly suited to this work. For in looking to the future the overriding consideration must be to capitalise the training and experience of the large number of junior staff, though several show aptitude for work in the laboratory by far the largest element will probably be best employed in the field at the point of contact with the public.





General statement on M.F.U. in 1959

At the end of 1959 there were eight separate units, compared with seven a year ago, and two more are being planned and will be formed in 1960.

There are five medical units:-

Ashanti/Brong Ahafo Unit

Volta Region Unit

South East Unit - covering the Eastern Region  
of Southern Ghana

North East Unit } - covering the eastern and western  
North West Unit } halves of Northern Ghana

and three specialised Units:-

Simulium Control Unit

Tsetse Control Unit

Snail Control Unit (Bilharziasis Unit).

The eighth unit formed in 1959 was in fact the re-opening of the Snail Control Unit. This unit which has been in abeyance since early 1958 has been recreated under a W.H.O. Senior Officer and is based on Kintampo. At the moment it remains fairly small and is concerned principally with matters relating to the vectors of bilharziasis; in time the unit will be concerned in putting together with other units and divisions of M.F.U. an epidemiological picture of this infection in Ghana.

The two new units envisaged for 1960 are firstly the creation of an extra medical unit by dividing the Ashanti/Brong Ahafo unit into two, one unit for each of these Regions and secondly the opening of a new medical unit in the Western Region of Southern Ghana which will complete the coverage of the whole country by individual medical units.

For the first time since the North West Medical Unit (based at Wa) was created in 1953 it has been possible to post a Medical Officer to take charge. Previously professional responsibility for the unit had been held in Kintampo. Thus all 5 medical units are now under Medical Officers.

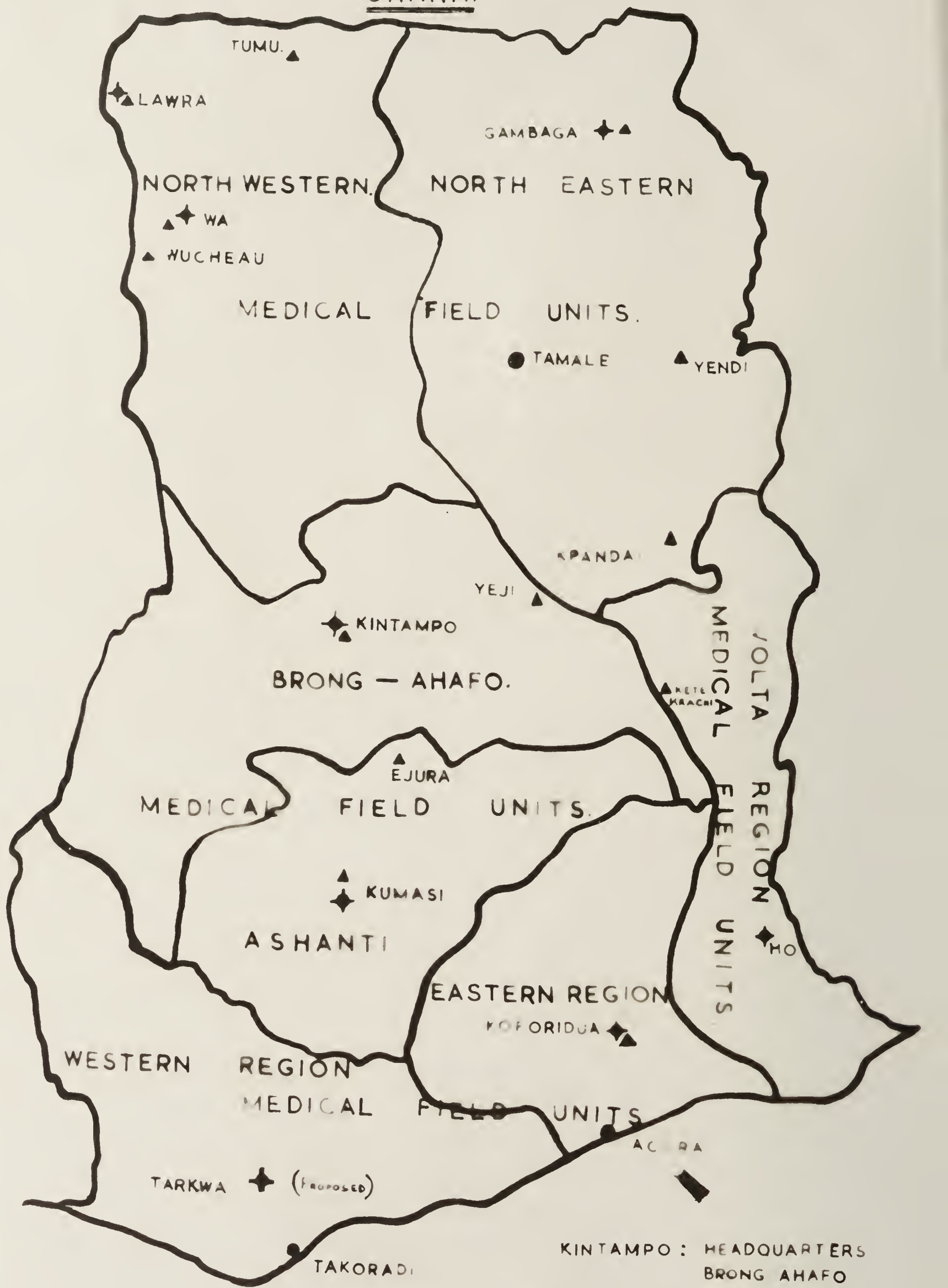






# THE DISTRIBUTION OF THE MEDICAL FIELD UNITS IN

## GHANA.



UNIT HEADQUARTERS



FIXED TREATMENT CENTRE



CAPITAL TOWN



KINTAMPO : HEADQUARTERS  
BRONG AHAFO  
SNAIL CONTROL UNIT.

KUMASI : ASHANTI

HO : VOLTA REGION

GAMBAGA : NORTH EASTERN

WA : NORTH WESTERN  
TSETSE CONTROL UNIT

LAWRA : SIMULIUM CONTROL UNIT

KOFORIDUA : EASTERN REGION

TARKWA : WESTERN REGION  
(PROPOSED)

The distribution of the units is shown in Map 1 opposite and in Appendix 1.

The work of Medical Field Units in 1959 has followed in natural sequence that of 1958; programmes are carried through irrespective of arbitrary divisions of time but the general pattern has naturally been similar to that of very recent years. Once again the greatest part of the work has been in mass campaigns against yaws. With aid from W.H.O. and Unicef a staggered countrywide attack against this disease was begun in Northern Ghana in 1956, in the Volta Region in 1957 and in Ashanti the following year. In this work all persons in the Regions are examined for yaws during the course of the Initial Treatment Survey and given at the same time an injection of penicillin, those who show no outward sign of the disease are given half the dose administered to cases. Resurveys are made at half yearly intervals on three occasions and further treatment given as necessary. This campaign against yaws in Northern Ghana was completed in July, 1959 and a full assessment made of the results achieved, these will be detailed later in the Report. The campaign in the Volta Region was also completed in 1959 - by the end of November. In Ashanti and Brong Ahafo good progress was also made with this work. The Initial Treatment Survey work in the Eastern Region, which had been planned to start in January 1960, was brought forward to late in 1959 consequent ~~on~~ the release of staff from the Volta Region campaign at a slightly earlier date than had been anticipated.

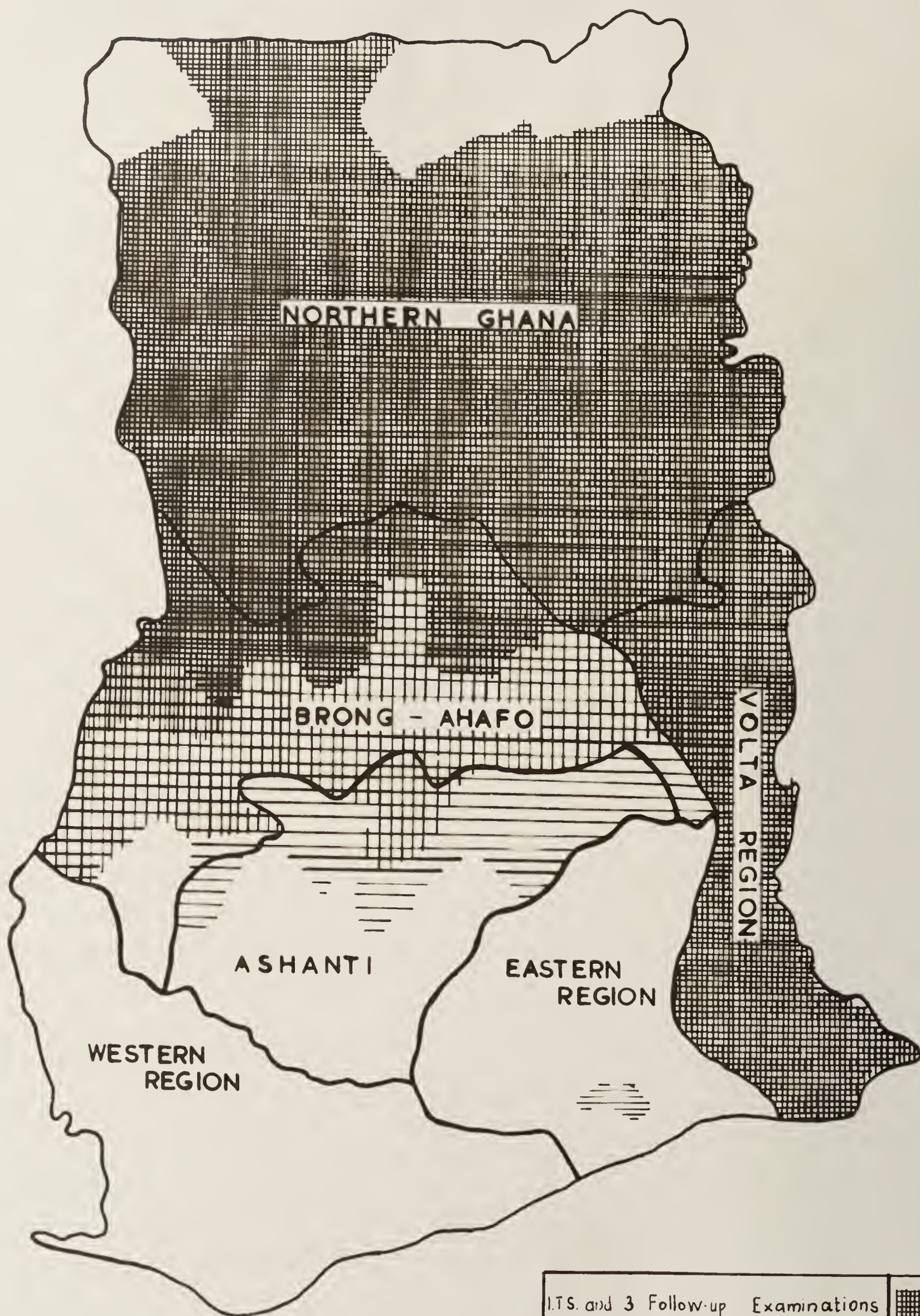
The piecemeal nature of this mass campaign against yaws which is being systematically applied in turn throughout the different Regions of Ghana may appear to be inimical to rapid control of the disease; this of course is partly true but simultaneous country-wide campaigns are beyond the resources of M.F.U. in all respects - particularly in supervisory staff. A patient, deliberate and planned attack gives very satisfactory results as the achievements in Northern Ghana have shown. When the medical unit is established in the Western Region of Southern Ghana anti yaws work will be begun there with staff who are expected to be released from the ebbing campaign of the Ashanti and Brong Ahafo Units.




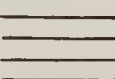






MAP 2 - SHOWING PROGRESS OF THE GHANA/WHO/UNICEF  
YAWS CAMPAIGNS TO THE END OF 1959



I.T.S. and 3 Follow-up Examinations	
I.T.S. and 2 Follow-up Examinations	
I.T.S. and 1 Follow-up Examination	
I.T.S. and no Follow-up Examination	



The present state in the various yaws campaigns is shown in Map 2 opposite and in Appendix 2 at the end of the Report. The actual progress made in each Region in 1959 is detailed later.

Particular attention has continued to be directed against trypanosomiasis in Northern Ghana. It will be recalled that a considerable epidemic of this disease was discovered in the area of South-east Mamprussi on surveys which were begun in 1957 and continued until early this year; nearly 1,000 cases have been found during this time. By the end of 1958 the surveys had been almost completed and the work done in the area in 1959 has been to conclude the surveys, the treatment of cases and also to round off the work of controlling tsetse fly in the locality.

Towards the end of 1958, as stated in last year's Annual Report, there were indications that another epidemic was occurring in the south eastern part of the Dagomba District of Northern Ghana; fortunately surveys which have been completed in the area this year are reassuring; there has indeed been a flair up of the disease south and east of Salaga but this has been limited to a fairly circumscribed locality of some 15 villages although beyond this and northwards towards Yendi there are one or two small areas in which the infection has shown an increase over recent years. Early in the year a further outbreak came to light in the North; this was in the valley of the White Volta stretching north of Daboya for about 50 miles. The population is widely scattered in small villages, some 141 cases have been found in a population of 5,000 in 35 villages. Finally in the North West of Northern Ghana, to the west of Wa, a very small outbreak was discovered towards the end of the year. The behaviour of sleeping sickness in Northern Ghana in the last three years has therefore shown the same trends as the disease did in the early 1930s when an epidemic in South-east Mamprussi spread westwards across the country in a period of two years. In the recent epidemic although the initial outbreak in the Mamprussi focus had got a foothold before it was discovered the subsequent events, because trained control staff were readily available, showed a different pattern from the



course of 25 years ago. The lesson learnt cannot be over emphasised; constant vigilance, constant surveillance are required in dealing with trypanosomiasis.

In all these foci treatment has been given to the cases found and in the areas where the work is possible anti-tsetse clearings have been or are being made in carefully selected places. To facilitate the clearing work the Tsetse Control Unit which had been based in the North East at Gambaga for two dry seasons 1957/58, 1958/59 moved over to Wa in the North West to devote one dry season to clearing and reclearing there. The permanent pattern of clearing work required in Northern Ghana, north of latitude  $9.30^{\circ}\text{N}$  has probably already been defined in the last  $2\frac{1}{2}$  years. It is hoped that these clearings can be maintained indefinitely, providing maximum protection with a limited expenditure. In future years clearing should be maintained at relatively low costs and expenditure should decline.

In Ashanti/Brong Ahafo limited surveillance for trypanosomiasis in 1959 indicates that the disease is not increasing as a result of recent events in the North. In the Eastern Region and in Volta Region the disease is rarely seen.

During the year the opportunity was taken to follow up a large number of cases of trypanosomiasis in the South East Mamprussi focus and to assess the results of treatment. Details relating to these and other matters in trypanosomiasis will be described fully in later sections of the Report.

During 1959 maps were made showing the distribution of the more common tsetse fly in Ghana; these were based on records which were taken over from the former Department of Tsetse Control and also from some records which have been kept in M.F.U. No maps appear to have been available previously.

The trend towards the increasing use of ad hoc teams for the survey and control work of M.F.U. has continued in 1959. Of major interest has been the formation of a number of bilharzia survey teams within most medical units. This work was planned in 1958 and a scheme evolved by the Medical Officer of the South East Unit at Koforidua and first implemented by him in the North East in mid 1959. The object





is to provide a very precise distribution map of the disease throughout the whole of Ghana as rapidly as possible; it is hoped that every village in the North and Volta Regions will have been investigated by the end of 1960. This will fit in well with the work being carried out at the present time by the W.H.O. Senior Officer and the Snail Control Unit.

M.F.U. were engaged in the outbreak of cerebrospinal meningitis which occurred in the dry season at the beginning of the year; cases were mainly in the Navrongo area and in south Mamprussi where camps were established - cases were also reported from the Kusasi District around Bawku but M.F.U. were not called in until the epidemic was over. The outbreak was smaller than occurred in 1958 but the pattern of distribution was surprisingly similar.

Cases of smallpox in Ghana in 1959 were relatively few (less than 110 were notified) and M.F.U. was not called upon to do mass vaccination work nor to provide isolation camps.

From time to time great epidemics of measles occur in Ghana, particularly in the Northern Region. Accurate information about them, and in particular regarding the subsequent death rate among children is completely lacking. M.F.U. is beginning to take an interest in this, the first steps were taken in 1959 to try to obtain a more accurate idea of the figures relating to outbreaks, but this will be a slow process.

Finally a brief word about the work of the Epidemiological division in Headquarters. In the past in M.F.U. overwhelming attention has been given to control work in yaws, sleeping sickness and smallpox and a great deal of attention to the collection of information regarding other endemic diseases but very little attention indeed has been given to making full use of the data collected. There are several reasons for this; the work requires a long period of training, it requires much time and in the face of pressing needs for staff in the field it is natural that they could rarely be spared. But in recent years the foundations have been laid of a division in Headquarters which in time will be able to provide more than the mere distribution patterns of the different diseases. This division is also the centre from which certain epidemiological investigations are carried out in the field. In 1959 these related to trypanosomiasis and guinea worm infection.



Staff

(a) Establishments

At the beginning of the new financial year, on 1st July, 1959 the establishment of salaried staff was increased by

- 1 Medical Officer
- 1 Field Superintendent
- 1 Field Assistant Grade I.

Later in the year the Ministry of Health seconded an Assistant Accountant to M.F.U., this has been an appointment of the greatest value allowing a more rational division of duties in Headquarters in Kintampo. The Ministry has also agreed to allow M.F.U. a certain number of storekeeping staff from the central pool, probably

Storekeeper Grade I	1
Storekeeper Grade II	9
Stores Assistant	4

In the early days of M.F.U. the junior staff did all manner of jobs, the first driver in 1944 performed several duties being a driver/mechanic and also an injector in a team. Nowadays the more obviously non-technical work is no longer in the hands of the technical staff, clerks appeared in the offices in 1950, stores personnel are now being provided. In this way all junior technical staff will soon be properly employed. But there are still one or two anomalies, M.F.U.'s library is increasing in size and importance and a Library Assistant is required to replace the Field Assistant working there.

It is equally important to note that the auxillary staff of M.F.U., the non-technical but specialised personnel such as artisans and tradesmen, clerks and storekeepers are now stretched to full working capacity and that steps have been taken in 1959 to increase our establishment. The need for this being that M.F.U. has grown a very great deal recently, the number of Units has more than doubled in the last 4 years, and the work has become more complex, but all these changes have been so gradual that it has been difficult to pinpoint the moment when the capacity of the permitted auxillary personnel had been exceeded.

Finally as an outcome of discussions held in 1959, on the subject of strengthening M.F.U., the Ministry of Health has agreed that a Training Medical Officer should be approved from the beginning of next financial year.





(i) Senior Staff

The establishment of Senior Officers now stands at 30; at the end of the year two posts remained unfilled, the Biologist and a Field Superintendent. A third and supernumerary Entomologist was posted to M.F.U. in August in readiness to take over the Simulium Control Unit when the present Entomologist-in-charge goes on leave.

Dr. Lyons and Dr. Simango both left M.F.U. during 1959 and new comers were Dr. Grant, Dr. Rosei, Dr. Korabiewicz and, at the end of the year though he will not take up his post till January 2nd - Dr. Beausoleil.

Mr. B. Aidoo, Field Assistant Grade I (M) was promoted to Field Superintendent in March 1959.

Senior staff posts are:-

Professional and technical

Specialist	1
Special Grade Medical Officer	1
Medical Officers	6
Entomologists	2 - 3 at post
Biologist	1 - Vacant
Regional Field Supervisors	3
Tsetse Control Officer	1
Field Superintendents	7 - 1 vacant
Reclamation Officers	4
Development Officer	1.

Grades ancillary to M.F.U. and on secondment from the Ministry of Health

Senior Executive Officer	- 1
Assistant Accountant	- 1
Assistant Stores Supt.	- 1
Laboratory Superintendent	- 1.

Some detail of senior staff distribution within M.F.U. are shown in Appendix 3 at the end of the Report.



(ii) Junior technical staff

The new scheme of service for junior technical staff which was introduced in 1958, and operated retrospectively from July 1957, is now well established. It was mainly concerned with converting the lower grade of Field Technician from a daily paid to an established salaried and pensionable grade.

The establishment and staff position relating to the junior technical grades, who form the bulk of M.F.U., is as follows:-

	<u>End of 1958</u>	<u>End of 1959</u>	<u>Approved establishment</u>
Field Assistant Grade I	20	22	24
Field Assistant Grade II	107	108	130
Field Technician	72	85	129
Field " (old style)	9	9	9
Recorder unestablished tsetse control staff	16	14	16
Pupil Field Assistant	42	10	.
M.F.U. Pupil		9	.
	<u>266</u>	<u>257</u>	<u>308</u>

The details of the distribution of the junior technical staff among the separate units are shown in Appendix 4.

No persons were admitted to the pupil training grade in 1959. The reduction of 9 during 1959 is accounted for:-

Promotion of 1 Field Asst. I to Field Superintendent  
 Retirement of 1 Field Assistant Grade I  
 Resignation of 1 Field Assistant Grade II  
 Transfer of 2 Field Assistants II } to the Stores branch  
 Transfer of 2 Field Technicians }

Whilst 1 Field Assistant and 1 Pupil left the service.

There are other details relating to this group of staff:-

4 Field Assistants Grade II in the Medical  
 Units were promoted to Grade I

7 Pupil Field Assistants and 2 Recorders passed to  
 the Field Assistant Grade II

15 M.F.U. Pupils passed to the Field Technician grade.

Seven field staff remained seconded to the Malaria  
 Unit.





(iii) Ancillary junior staff on M.F.U. establishment

The only post, that of artisan grade II, which was inherited from the former Department of Tsetse Control, was filled in 1959 for the first time.

(iv) Junior staff seconded from the Ministry of Health

Clerical and stores staff

All clerical and stores staff are seconded from central pools within the Ministry of Health. Our requirements are agreed upon by the Ministry and these are filled as far as possible. The present position is as follows:-

Clerical

Executive Officers	2	-	1 vacancy
Clerical Officers	12	-	8 vacancies
Clerical Assistants	6		
Stenographers	2	-	1 vacancy
Typists	13	-	1 vacancy

Stores

Storekeeper Grade I	1		
Storekeeper Grade II	8	-	5 vacancies
Stores Assistants	9	-	9 vacancies.

There are a considerable number of vacancies for the grade of Clerical Officer; the principal difficulty arising out of this is that it is not possible to provide an officer of this grade to take charge of the main ledger in each of the separate units. To deal with the problem of lack of staff in the stores grades it is necessary to fill the gaps with M.F.U. junior technical staff who have had no particular training in this work, this is not without its dangers.

(v) Daily paid non-technical staff

On the regular establishment are:

Tradesmen etc.	21
Drivers	37
Watchmen	25
Carriers and Labourers	200
Miscellaneous	15
	<u>298</u>

In addition there are a number of persons employed in these grades by both Simulium Control and Snail Control Units who because they are paid out of Development Funds do not figure in the regular establishment. Finally the Tsetse Control Unit employs a large number of labours seasonally for tsetse clearing work; usually about 600 for 5-6 months.



(b) Staff health and welfare

The health of the M.F.U. staff in 1959 has been good. Although a few persons were admitted to hospital for varying periods there was little serious illness. No case of tuberculosis or of trypanosomiasis occurred. One Field Assistant has been invalided - out of salaried junior staff of 210 - he was due to retire early in 1960. Another Field Assistant has been before a Medical Board and the outcome is still unknown. A number of cases of guinea worm infection have again occurred among the staff in 1959.

The older members of the staff, some of whom have been on trek in the field almost continuously for up to 20 years, naturally show signs of this sort of life even if they are well below 45 which is the normal retiring age. It is not possible to employ more than a very limited number of these older men in the various headquarters and consideration of this problem will probably be given at a Departmental Committee on Service Conditions in M.F.U. which is proposed and should meet early in 1960.

No opportunity can be missed to remind readers of the circumstances under which field staff work. They move from one rural community to another on an average of once a week and this is continued throughout their service, the routine being broken only by periods of leave. Normal home life is impossible under these circumstances. To offset what might be regarded as the disadvantage of service with M.F.U. the Government agreed in 1957 that Field Assistants and Field Technicians should be granted a salary scale which took into consideration this element of hardship. In addition camp equipment is now provided, to the camp bed and a mosquito net previously loaned to each person in the field there was added in 1959 a folding chair and a folding table. On the whole the staff show a very remarkable aptitude and liking for work under field conditions, to them inducements are not essential but are, for all that, very acceptable.





(c) Training

From 1937 to 1955 the training of persons joining M.F.U. was given almost exclusively in the field. The recruit joined a working team and gained experience in the different techniques and was ultimately formally passed out as competent in simple microscopy, in vaccination and in other techniques. After 1955 we began to institute short laboratory courses for trainees usually of about 3 months duration and in the last 4 years have been able to provide these for some 80 pupils. This stage is drawing to a close and what is now required in the sphere of training is not so much to give simple courses in laboratory techniques to new entrants, for there will probably be little recruitment to M.F.U. for some time, but to provide more comprehensive training for staff already at post. This would partly be in preparation for future new work of M.F.U., for example the possible provision of staff to assist in Health Centres, or in our undertaking forms of mass control not yet touched upon, such as B.C.G. campaigns; it would also be directed to an all-round raising of standards and usefulness in operations already undertaken. A large proportion of the staff would benefit from training in the theory of many aspects of M.F.U. work - for example general principles governing the spread and control of communicable disease, but at present such training can only be given to very few indeed, its wider application would increase a man's interest in his work beyond the various limited fields in which he might be employed and would thus measurably enhance his potential value.

In 1959 the twelfth and last batch of trainees (M.F.U. pupils) attended the Training Laboratory in Kintampo for the standard course under the Laboratory Superintendent. For others field training was continued under the direction of the Medical Officers in charge of the separate Units. This year also saw the beginning of training a few selected and older members of the junior technical staff for work in Health Centres but a medical qualified training officer is necessary to ensure that the new and more ambitious training projects are built on sound foundations. This post has been agreed to in the Ministry of Health.

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Of the two necessary adjuvants to sound training, a teaching museum and a training manual, only limited progress has been made with the former, the large room in the ground floor of the office block, formerly the store, was converted into accommodation suitable for this purpose in 1959. This again will be slow work for it really requires full time attention over a long period. No advance whatever has been made this year in providing a training manual although Dr. Lyons did produce very valuable training notes for the use of the North East Unit - these and other material already available must be worked up into a first class manual. The training officer will have a very useful role to play in these matters.

Administration of M.F.U.

During 1959 there has been a greater devolution of administration in headquarters. Four divisions,

General

Personnel and Establishment

Accounts

Transport

are now responsible to the Specialist through the Tsetse Control Officer, i.e. all purely administrative matters pass through one channel. It is hoped that in due course it might be possible to provide a professional officer to act similarly in respect of the other divisions. This change is represented graphically in Appendix I.

Although some progress has been made in 1959 in preparing the M.F.U. handbook, which will serve as a general guide to Senior Officers, in M.F.U., and in particular to those in charge of Units, it must be admitted that this has been disappointingly slow. As with the preparation of a teaching museum and training manual this work should be given undivided attention for some time; unfortunately this is quite impossible in the press of ordinary day to day demands.





### Buildings

The number of our buildings increases yearly.

In the First Development Plan the buildings at Lawra, a house, office, store, treatment centre and garage which are now used mainly by the Simulium Control Unit were completed by the Lawra District Confederacy Council in 1959; building had been in progress since 1956. £G12,500 was provided for this project. Similar buildings to those at Lawra have been provided for the headquarters of the South East Unit at Koforidua under the Interim Development Plan (1958-1959). By the end of the year the work which begun in 1958 had been completed by P.W.D. and a small balance left out of the £G12,000 originally provided was being used to effect improvements to the layout of the offices and treatment centre. The Ministry of Health has also been able to provide funds for quarters of staff at the several M.F.U. stations and great progress was made in 1959 in their construction. In the Second Development Plan, 1959-1964, a sum of £G20,000 has been provided for M.F.U., principally for the buildings required in Tarkwa as the headquarters of the proposed South West Medical Unit but at the end of 1959 work had not begun on this.

The calendar year overlaps parts of two financial years. In 1959 construction work under the Ministry of Health Minor Works Programme was carried out for M.F.U. mainly in Kintampo, Lawra and Gambaga. Much of this is done by M.F.U.'s own building staff. Details are also given in Appendix 5.

Since M.F.U. took over the Department of Tsetse Control it has been obliged to maintain certain of its own buildings and in 1959 all our buildings in Northern Ghana became the responsibility of this organisation, additional funds being provided for this work. For the rest of the country maintenance and renovations are carried out by P.W.D. except on those buildings which have been constructed by M.F.U.



Transport

The Development Officer continues to maintain our fleet of vehicles by a system of regular visits to the headquarters of the individual Units. Trucks requiring considerable work which cannot be undertaken during these visits are brought to the transport yard at Kintampo. Here only the biggest jobs cannot be undertaken and it is relatively infrequent that a vehicle has to be sent either to Government Transport or to one of the motor firms for work to be done. It is hoped that it will be possible to augment to Development Officer's staff in the near future, he has only one salaried officer, an artisan grade II; in addition there are two fitters grade I, and two in the second grade.

The vehicles with M.F.U. at the end of 1959 were as follows:-

<u>Provided by Government</u>	<u>Provided by Unicef</u>	<u>Total</u>
40	13	53

They are detailed in Appendix 6.

M.F.U. water and electricity supply Kintampo

During 1959 a new Braithwaite reservoir tank with a capacity of 10,000 gallons was erected for M.F.U. by the Department of Rural Water Development to replace the older one. Water available from the spring source is less than 20,000 gallons aday and our needs approach this figure. It is clear that with an increase of official buildings in Kintampo consumption will continue to rise and unless another source of supply is found the use of water may have to be restricted in some way. During March, 1959 such a restriction became necessary, the failure of the rains in 1958 caused a considerable drop in water flow from the spring.

The two 13½ kw. generators will be inadequate for lighting official buildings when the new quarters are completed and certainly a larger generator is required before the projected Health Centre Superintendents training school is built in Kintampo.





### Library and publications

A Field Assistant acts as Librarian but as the size and importance of the library increases this is hardly satisfactory and during 1959 arrangements were discussed to obtain the services of a Library Assistant. Mr. C.Tettey, Librarian at the Medical Research Institute, Accra paid a visit to Kintampo and discussed the provision of equipment and publications and the proposal to provide a larger library unit in M.F.U. headquarters.

During 1959 a paper was published from M.F.U.

Human trypanosomiasis in Northern Ghana (1950-1956)

- An epidemiological review

W.A.M.J. viii 5 165-184 D. Scott

and the Annals of Tropical Medicine accepted a paper on certain epidemiological aspects of guinea worm infection.

Mr. La Croix has presented a paper on a trial of the use of grass mat passages in protecting humans from attacks of tsetse flies.

### Visits and visitors

No official visits abroad were made by any of M.F.U. staff in 1959.

In Kintampo we received a private visit from His Excellency the Governor-General, the Earl of Listowel in March. The Ag. Chief Medical Officer, Dr. E.W.Q. Bannerman and the P.P.H. Advisor Dr. Hojer came in July, the Permanent Secretary, Mr. C.M.O. Mate and the General Secretary of the Ministry of Health Mr. W.A. Stark paid official visits later in the year.

The Principal Medical Officer Ashanti/Brong Ahafo Dr. E.J.F. Djoletto has visited M.F.U. headquarters on a few occasions during the year.





Representatives of international bodies have been, from Unicef Dr. C.A. Egger of the Paris office and Mr. Paul Gordon area representative in Lagos. Dr. D.McMullen and Mr. Z.J. Buzo of the W.H.O. Bilharziasis Advisory Team have also paid a visit to M.F.U. headquarters.









Polyvalent & Ad hoc Tryps Survey	
Bilharzia Survey	
Mass Vaccination	
Non-Unicef Yaws Campaign	

Summaries of the work done by the separate units  
of M.F.U. in 1959

The following maps will assist the reader in this section.

Map 1 (Facing page 9) shows the areas in which the Medical Units operate and marks the M.F.U. fixed treatment centres.

Map 2 (Facing page 10) shows the state of the progress of the campaign against yaws.

Map 3 (opposite) indicates the areas within the different Regions covered by the units in which survey and treatment work, other than that carried out in the yaws campaign, has been conducted in 1959.

This section is concerned only with giving a broad description of a unit's work in 1959; more detailed information will be found in Part II of this Report in sections dealing with disease distribution and other subjects.

(1) Medical Units

(a) The Ashanti/Brong Ahafo Unit

The field staff of the Ashanti Unit have been engaged almost exclusively in the campaign against yaws throughout the whole of 1959. But a small team made a survey for trypanosomiasis near Kintampo and, in addition in this field the check point established to diagnose the infection in travellers which was opened at Yeji some years ago was maintained. A feature new to M.F.U. and which is at present being tried out in the Ashanti/Brong Ahafo Unit is the introduction of a scheme of systematic surveys carried out by fixed centre staff into the surrounding districts; the emphasis is on systematic. These surveys mainly for cases of yaws, trypanosomiasis and leprosy, which are given treatment, are carried out with the same precision as are the surveys performed by the large mobile teams. In the past fixed centre staff have occasionally been instructed to make surveys in the communities lying close at hand when opportunities arose but these efforts have failed owing to the lack of precision of direction.





The Ashanti/Brong Ahafo Unit was also able by the end of the year to form an ad hoc team for the survey of bilharziasis infection; work began in the Kintampo area.

The four fixed treatment centres of the Region were maintained during 1959.

(b) The Volta Region Unit

As in Ashanti the greater part of the work of this unit in 1959 was in the campaign against yaws; this had begun in February, 1957 and was completed in November, 1959; an initial treatment survey had been followed by three re-examinations at six monthly intervals. In the last few weeks of the year as this work was concluded it was possible to transfer very experienced staff to the South East Unit where a yaws campaign was due to begin. The somewhat diminished body of the unit has recently been engaged in implementing a long term surveillance programme against yaws, of which more will be said later, and at the same time ad hoc teams have been established to carry out surveys for bilharziasis, attention being given first to those areas which are important in the Volta River Project.

The single treatment centre at Keta: Krachi was manned throughout the year.

(c) The North East Unit

This area retains its undoubted lead as having the most interesting range of work.

Teams were employed in completing the investigation into and control of the outbreak of sleeping sickness which had been discovered a few years earlier in South-east Mamprussi; and investigations were made in the southern part of Eastern Dagomba where the disease was feared to have spread; other areas known to be liable to infection were also covered. These were all polyvalent surveys.

Ad hoc teams were formed to investigate the incidence and distribution of bilharziasis and in the six months of their operation they covered a very considerable part of the area under this unit, most of South-east Mamprussi and much of the Frafra and Navrongo districts.





The unit also carried out the final steps of the yaws campaign in the North East, the last of the three follow up examinations. A policy for the long term surveillance against yaws was subsequently introduced.

There was a dry season epidemic of C.S.M., smaller than in 1958, but the threat of an outbreak requires that staff should be constantly ready. Finally the unit was able to provide for a short period a few persons to make a special vaccination campaign against smallpox in a limited area of Mamprussi.

A new fixed centre for the treatment of sleeping sickness and yaws was opened at Kpandai during the year.

(d) The North West Unit

The yaws campaign was concluded by mid 1959, the final resurveys had been made in the Tumu and Western Gonja administrative districts since the beginning of the year. Thereafter the unit turned its attention to completing the polyvalent survey in the Wa administrative district which had been interrupted over a year ago, carrying out bilharziasis surveys and, towards the end of the year, implementing a plan for the long term surveillance for yaws in the North West.

An interesting feature was the discovery of an outbreak of trypanosomiasis along the middle section of the White Volta. A Field Assistant on yaws control work observed a few persons whom he suspected to be infected, took blood films and sent them back to the treatment centre at Damongo where microscopy confirmed his suspicions. A survey and treatment team was formed and discovered nearly 150 cases within six weeks in the area. This particular outbreak which had undoubtedly originated from South-east Mamprussi made it necessary to look for evidence of a flare up of the disease even farther to the west, in the old focus of infection in the North West corner of Northern Ghana in Lawra and Wa districts. Two very small and obviously new foci were discovered there.



(e) South East Unit

For the greater part of the year the unit remained relatively small; work was completed in the polyvalent survey in the Dawa area. In October the whole character of the unit was transformed by the arrival of additional staff, principally from the Volta Region Unit, and by the preparation made for the yaws campaign which was begun in early November.

The treatment centre at the units headquarters in Koforidua was opened during 1959 for the treatment of yaws cases only for trypanosomiasis has not yet been found in the Region.

(2) The Specialised Units

(a) The Tsetse Control Unit

Tsetse control work in a calendar year is divided broadly into three phases, the first four months dry season, six months of wet season and a final dry period of two months. In the first few months of 1959 the unit was principally concerned with continuing the clearing work already well advanced since 1957 in the trypanosomiasis areas of South-east Mamprussi. By mid year it became necessary to move the unit to Wa for the next stage in the clearing operation which was to be directed against the old foci in the Lawra and Wa districts; it has already been recorded that two very small outbreaks were discovered in the North West towards the end of the year. Clearing of certain rivers and streams systems in the North West began in November. It was also necessary to carry out some clearing work in the mid White Volta area where an epidemic had been discovered and also to make a very limited amount of clearing south east of Salaga where another small epidemic of trypanosomiasis has also recently been discovered. Ferry clearings were maintained.

In addition a variety of investigations have been conducted into distribution of certain species of tsetse and a comparison of fly catches made by hand and by Morris traps.





(b) The Simulium Control Unit

The unit completed its third years work in 1959. It has two principal functions, the first to continue the studies on the bionomics and distribution of s.damnsum and the second to apply measures of control against this fly. In previous years emphasis had been on the survey work but in 1959 increasing attention has been given to control experiments and at the end of the year an ambitious project was launched covering the whole of the Tumu and Lawra districts which is to be continued for a year. In 1957 control trials were made with D.D.T. in fuel oil on the lines recommended by the late Dr. Crisp, the next year in addition trials were carried out with a D.D.T./clay mixture which had first been used by the Fisheries Department and in 1959 a new preparation Didimac 25 was used as the larvicide for application to streams and rivers and this has given, in the main, extremely promising results. Didimac appears to<sup>be</sup> effective over a much greater range than D.D.T. in oil, a point of considerable importance. With the experience of the last three years behind it, experience in both fly survey and investigation work and also in methods of control, the unit is now poised to carry out a control programme on a scale sufficiently large to provide significant results.

As in previous years the work of the unit has been restricted to areas of Northern Ghana north of latitude  $9.30^{\circ}\text{N}$  where onchocerciasis is most serious but in any event to extend our interests south of this would require the services of additional experienced senior staff.

(c) The Snail Control Unit

Dr. McCullough (senior officer of W.H.O.) arrived in Ghana in mid 1959. He is at present working in Kintampo where laboratory accommodation and junior staff have been placed at his disposal. During the last six months Dr. McCullough has carried out a number of surveys for the vectors of bilharziasis in different parts of Ghana and has been preparing for experimental investigations - a number of snail tanks have been constructed for the units use.



Part II

Scientific and technical  
Explanatory note

In this Part of the Annual Report the different aspects of the work of M.F.U. are presented in some detail. It has already been explained that in order to provide a background against which the work of M.F.U. in 1959 might best be examined it may be necessary in many instances to present the years work as part of a general review of a particular subject.

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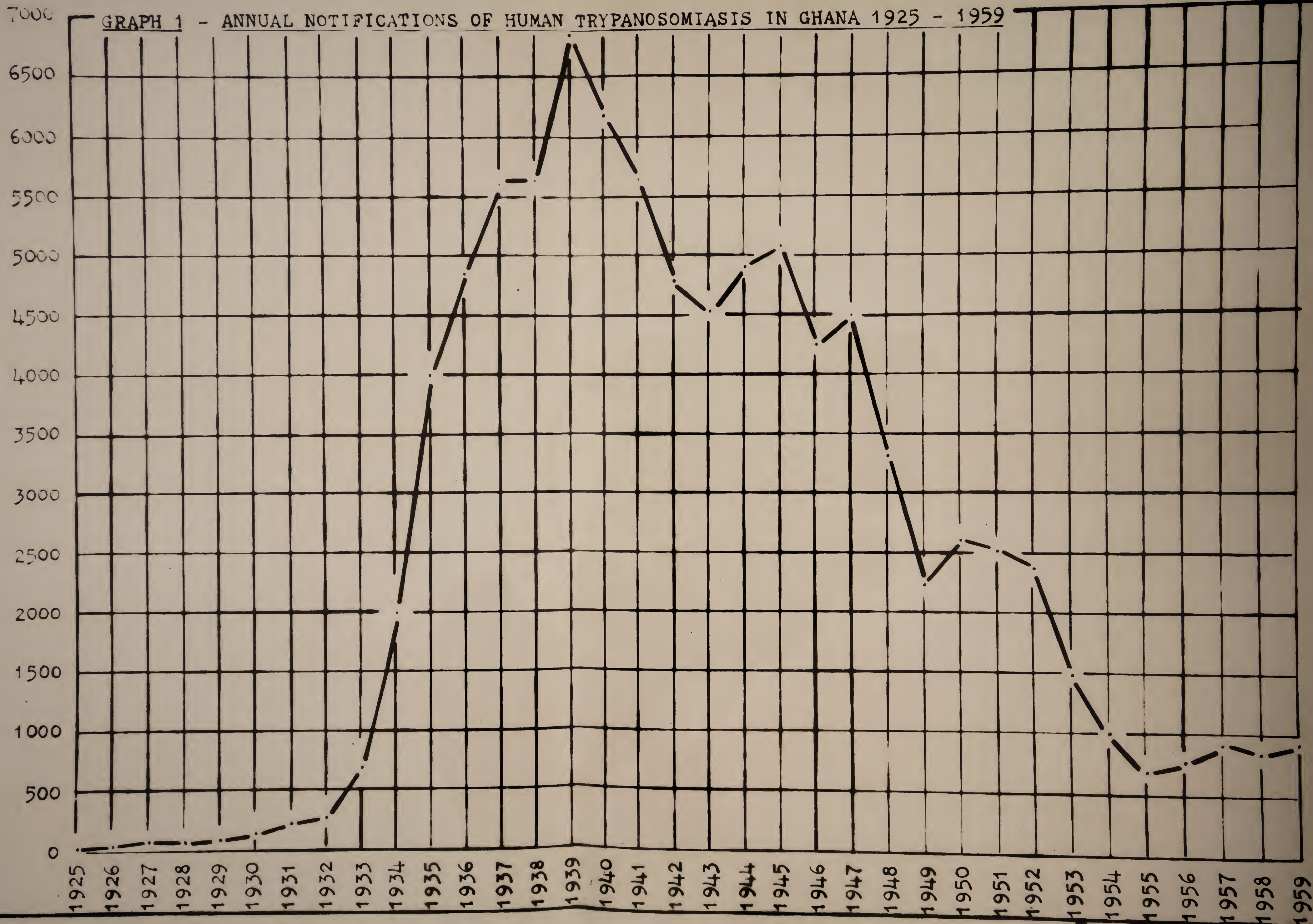








NUMBER OF TRYPY CASES





(1) Trypanosomiasis

i. Introduction

Anyone who has read these reports in recent years knows the basic and established facts relating to the broad behaviour of trypanosomiasis in Ghana.

Endemic period 1900-1930

There is ample evidence to show that the disease occurred at what might be termed normal endemic rates from the time that this infection was put on the medical map - after the discoveries of Bruce and others in the early 1900s - until about 1930.

Epidemic period 1930-1950

From 1930 or thereabouts Ghana was struck by an epidemic of the disease, this was part of a pandemic which was moving from east to west across the western side of tropical Africa - starting in the Congo in about 1915. The experience of Ghana is shown in the accompanying graph 1. The epidemic lasted roughly 20 years from 1930-1950.

There were two main localities of infection, both occurred in the north, one on the east side in the district of South-east Mamprussi and one on the west side Tumu/Tawra/Wa. Of course other parts of the country were involved in a general increase, in the North and in Ashanti, but the two principal foci were very evident.

Endemic period 1950-1956

In the seven years 1950-1956 much of the area of Northern Ghana and of Ashanti was re-examined for sleeping sickness (the disease is hardly found in Ghana outside these regions.)

It is possible to generalise regarding the findings of this "endemic period."

- (a) The incidence of the disease was low - about 0.2%.
- (b) The distribution of the disease both in Northern Ghana and Ashanti shows a consistent pattern.
- (c) One of the features of this pattern was the presence of permanent foci in Northern Ghana, small areas in which the disease incidence, as shown by successive surveys, remained higher than in the surrounding localities, infection rates were rarely more than 0.75%.





ii. The present trend

(a) The epidemic in Northern Ghana  
Distribution and epidemiology.

In March, 1957 an outbreak of trypanosomiasis was discovered in South-east Mamprussi. Within a period of a few weeks three cases from the village of Timpella attended for treatment at our clinic in Gambaga. An immediate investigation in Timpella revealed a total of 59 cases in a population of 180. As Timpella was at the centre of one of the foci of trypanosomiasis in Northern Ghana which had recently been defined and as it also lay in the area which was so heavily involved in the 1930-1950 epidemic it was feared that these recent findings might indicate a general recrudescence of trypanosomiasis.

Between March, 1957 and May, 1959 the whole area of South-east Mamprussi has been examined; the findings were:

<u>Population</u>	<u>Cases found</u>	<u>Incidence %</u>
56,478	659*	1.2

(The work of 1959 alone will be indicated precisely later but it is hardly important to separate it at present.) Based on the results of investigations made in the endemic period 1950-1956 two foci of trypanosomiasis in South-east Mamprussi had been defined and it was impressive how these were particularly picked out again as the worst hit areas in the district in this recent epidemic; in addition, however, there was a third and smaller focus which had not been suspected before and came to light only in 1959 for it lay in that part of the district which was surveyed last.

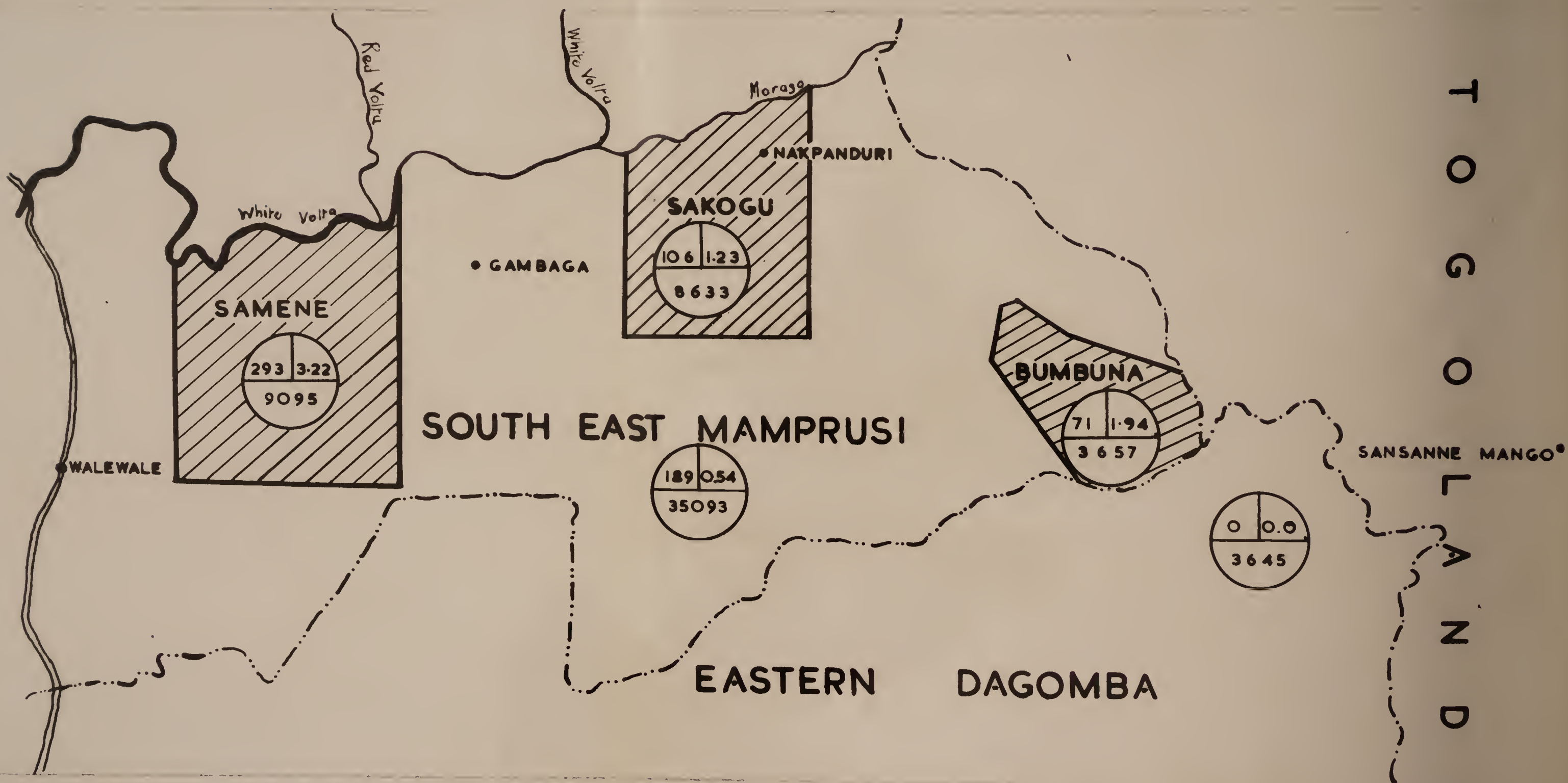
\*Not including some 300 other cases occurring in this area who were discovered in resurveys etc. or who attended voluntarily for treatment.







**MAP 4 - SHOWING THE AREA OF SOUTH EAST MAMPRUSI OF NORTHERN GHANA IN WHICH  
AN OUTBREAK OF TRYPANOSOMIASIS WAS DISCOVERED BETWEEN  
1957 - 1959**



Note the three particular foci of infection in the area shown hatched.

Survey findings are encircled : 1st numerator - number of cases of trypanosomiasis found.  
2nd numerator - incidence per cent.  
denominator - population examined.

The north east corner of Eastern Dagomba was also surveyed since it lay adjacent to the BUMBUNA FOCUS of South East Mamprusi.

The figures lying in the unhatched space of South East Mamprusi represent the findings in the whole of the area less those of the three foci: SAMENE, SAKOGU and BUMBUNA.

At this stage it is necessary to introduce a map - see Map 4 opposite which shows the area of South-east Mamprussi and the survey findings 1957-1959 in the three foci - Samene, Sakogo and Bumbuna. The findings were:-

	<u>Population</u>	<u>Cases</u>	<u>Incidence %</u>
Samene focus	9,095	293	3.2
Sakogo focus	8,633	106	1.3
Bumbuna focus	<u>3,657</u>	<u>71</u>	<u>1.9</u>
Total for foci	21,385	470	2.2
Rest of South-east Mamprussi	<u>35,093</u>	<u>189</u>	<u>.5</u>
	<u>56,478</u>	<u>659</u>	<u>1.2</u>

As the Bumbuna focus, discovered only in 1959, lies at the edge of the South-east Mamprussi area it was necessary to continue investigations into the contiguous part of Eastern Dagomba which lies south of it, no cases were found there in 3,645 persons examined and clearly we had come to the end of the focus in that direction, this area is also shown in Map 4. The eastern border of South-east Mamprussi is the frontier between Ghana and Togoland; the Medical Officer at Sansanne Mango was advised of the position in order that he could investigate the probability of this last focus overlapping into French country.

Three other smaller outbreaks have been discovered in Northern Ghana, all in 1959, and the investigations of these localities were made entirely within this year and the findings are given below, in this Table the figures relate only to what might be described as the focus of infection, larger contiguous areas were indeed surveyed but here the worst affected locality in each area only is shown. The full figures are given later.

<u>Area</u>	<u>Population examined</u>	<u>Cases</u>	<u>Incidence %</u>
Kpembe South/Alfai	6,431	48	.75
Mid Volta	5,017	127	2.53
West Wa (2 foci)	1,980	29	1.5











Distribution of human trypanosomiasis


i. Epidemic of the 1930s. The two principal foci of this period are approximately enclosed by the heavy lines.

ii Endemic period 1950-1956.

(a) Five major foci marked 1-5 shown  3. Tongo  
1. Samene 2. Sakogu  
4. Sapeliga 5. Kpandai

in which infection rates were up to 0.75%.

(b) Nine minor foci shown , infection rates to 0.5%

(c) Areas of low endemicity marked , incidences 0.05-0.2%

(d) Areas of very low endemicity left blank.

iii. Epidemic period 1957-

Hatched red, are the four areas in which outbreaks have occurred and been discovered.

A South-east Mamprussi, enclosing

the old foci 1 + 2

B Kpembe south & Alfai

C Mid White Volta

D West Wa.

Map 6 Northern Ghana

Showing the known limits of *G. palpalis*. This fly has so far been found only on the hatched side of the line.

The negative signs indicate where careful investigations have failed to discover *G. palpalis*.

*G. tachinoides* is found at very many points within the palpalis-free area.








Map 5 Northern GhanaDistribution of human trypanosomiasis

i. Epidemic of the 1930s. The two principal foci of this period are approximately enclosed by the heavy lines.


ii. Endemic period 1950-1956.


(a) Five major foci marked 1-5 shown 

1. Samene 2. Sakogu 3. Tongo

4. Sapeliga 5. Kpandai

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Map 6 Northern Ghana

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*G. tachinoides* is found at very many points within the palpalis-free area.





Map 5, a composite map, possibly helps to explain the situation for it shows for Northern Ghana

- (a) The major areas hit by the trypanosomiasis epidemic in 1930-1950.
- (b) The distribution of the disease in Northern Ghana during the endemic period 1950-1956.
- (c) The four newly discovered outbreaks of varying size since 1957.

There are certain epidemiological features which are evident from a study of this map alone. In the first place the small residual foci of infection which were maintained after the first large epidemic had waned tended to be concentrated within those larger localities which had been most severely affected in that epidemic. Even if this cannot readily be precisely explained it is more or less what might be expected. The second point is that the upward surge in the disease, that is the four new outbreaks that have recently been discovered, has occurred in localities which knowledge of the previous history and behaviour of the disease in Ghana would be expected to be the most likely places to be first attacked with the reintroduction of epidemic conditions.

It is very likely that in some way or other the present series of outbreaks have a common or closely related origin. There seem to be two principal ways in which this might occur. In the first place a variety of T.gambiense which is more easily transmissible than the strain which normally occurs might have been introduced or have occurred by mutation somewhere in Northern Ghana. Or, on the other hand, climatic conditions in recent times may have established better conditions for close contact between man and fly over the north generally. In either event the result would be an increase of the disease which would be most noticeable in those areas where conditions for transmission were already the best existing in the country, that is in the vicinity of what were understood to be the permanent foci.

The pattern of the distribution of trypanosomiasis in endemic and epidemic periods appears to be basically the same, in passing from one stage to the other there is only an enlarging of the picture, perhaps analogous to the process of enlarging in photography. There is probably little difficulty in accepting this argument so far.





Two possible causes have been put forward to account for a recent series of outbreaks of trypanosomiasis in Northern Ghana. It is suggested that climatic conditions might, over a period of several months or even years, have altered sufficiently to establish more intimate contact between man and tsetse. An examination of the simple meteorological records which have been kept in Gambaga since 1930 does not lend any support to this theory, though of course changes sufficient to cause a new man/fly relationship may be too fine to appear in the simpler records of climate which are kept. However if this series of outbreaks had been due to climatic change it would be expected that they would have occurred simultaneously but this certainly was not the case. The epidemic of South-east Mamprussi probably started in 1956, the foci in west Wa are very recent; we have constantly borne in mind the possibility of the epidemics of the eastern side being followed by another in the west as in the 1930s and have planned surveys accordingly. The last survey in the area of west Wa which has now been affected was in 1957, The findings of 1957 and 1959 are shown below.

<u>Year</u>	<u>Population</u>		<u>Cases</u>	<u>Incidence %</u>
1957	1,730	} same grouped villages	7	0.4
1959	1,980		29	1.5

Quite apart from this evidence of the recent origin of the outbreak in west Wa further proof will be given shortly of the actual introduction of the disease in outbreak form in this area in 1959. Furthermore had the epidemic been long established it is fairly certain that it would have involved a much greater area than it did, only some four villages grouped together in each of the two west Wa foci.

It seems, therefore, that we can discount the role of cyclic variation in climate as being responsible for periodic outbreaks of trypanosomiasis.

On the other hand there seems to be considerable evidence that the flair up of the infection in two of the epidemics which were discovered in 1959 - in mid White Volta and in west Wa - had resulted from the introduction of a strain of trypanosomes from an epidemic already established.



In May, 1957 when we began the survey in the mid Volta area a fairly high incidence of infection was found in the second village examined, 26 cases in 2,020 persons. The name of the village is Langbinsi and it was immediately recalled that a village with the same name lay within the Samene focus of South-east Mamprussi about 70 miles to the North East. It was soon discovered that in 1955 a dispute had arisen between two sections of Langbinsi village in South-east Mamprussi, at a time when that village was probably already more than ordinarily infected with trypanosomiasis, and subsequently one of these sections had moved South West into the White Volta valley and established the settlement which bore the old name. It seems very likely indeed that the other communities which were infected in mid White Volta had, in turn, received their infection from the strain which had been introduced in this way. In West Wa the evidence of the importance of the introduction of a strain from an epidemic was even more convincing. Here, in October, 1959, in the northern focus (a group of hamlets) 11 cases occurred in 1,176 people. One of those infected, a man of about 30, had come to this area about 6 months before from the village of Nawuni in the mid White Volta district. He had left Nawuni just before our survey team had arrived there in May, and in Nawuni we had found 10 cases of trypanosomiasis in a population of 136. Most of these cases were in fact well known to this man. There can hardly be any reasonable doubt that the man from mid White Volta was already infected when he arrived at the remote locality in West Wa. Now in recent years there have undoubtedly been a few cases of trypanosomiasis in West Wa either introduced from outside or occurring locally yet the incidence of the disease has continued to decline slowly and the occurrence of 11 cases at this particular locality represents a very definite and sudden upward trend of the incidence.

These observations on the behaviour of trypanosomiasis in Northern Ghana would suggest very strongly that outbreaks of the disease are due to the presence of an epidemic strain of T.gambiense and that, in general, resurgence of infection in old foci is due to the introduction of such a strain by the movement of infected persons. Numbers of cases alone may be much less important than quality of the strain of parasite.

Regarding the origin of an epidemic strain there is no evidence whatsoever.



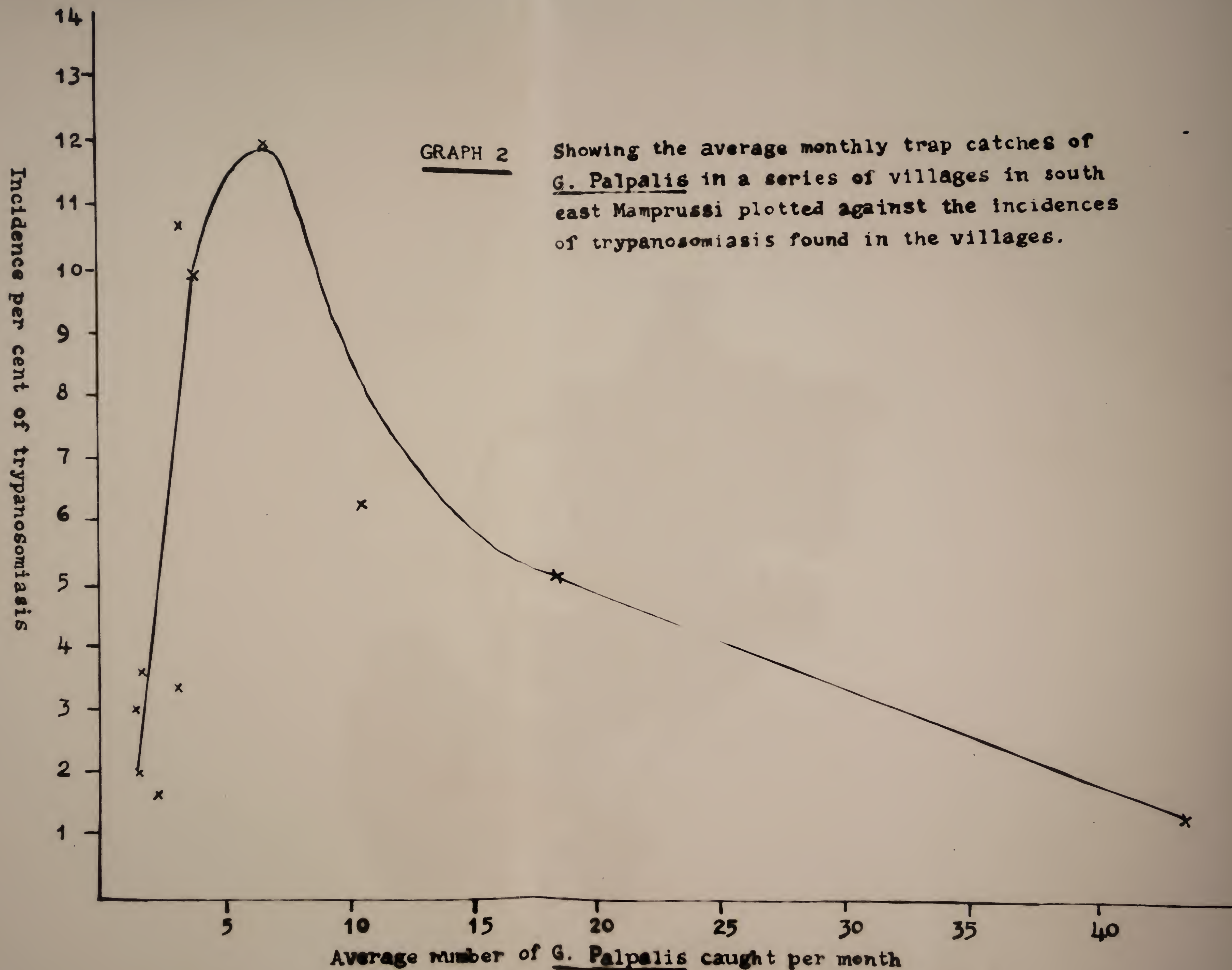


Having considered the possible cause of periodic outbreaks of trypanosomiasis it is now necessary to turn to the second great problem and consider what are the factors which determine the distribution pattern in Northern Ghana, shown in Map 5. As long ago as 1950 it was suggested that the two areas of the north which were severely affected by the epidemic in 1930-1950 lay in very close association with the upper limit of G.palpalis; it was thought that this might be explained by the fact that where this fly approaches the limit of its distribution climatic conditions probably restrict its movement more and more and, under these circumstances, where contact occurs with man this is liable to be intimate and sustained favouring relatively rapid transmission of infection. During the last year or so two factors have come to assist in examining this matter, firstly the events in the north have brought the circumstances of trypanosomiasis distribution into relief more clearly and secondly we have been able from the records of the former Department of Tsetse Control, which was recently absorbed into M.F.U., to obtain tsetse fly distribution maps. Knowledge of the distribution is still patchy in places and these gaps are being filled in as soon as possible; in the meantime Map 6, which shows the distribution of G.palpalis in Northern Ghana, does lend very considerable support to this theory regarding the relationship between the distribution of trypanosomiasis and in particular the occurrence of persistent foci, and the approach to the limit of the distribution of the fly. Map 6 is drawn on transparent paper and superimposed over Map 5 to assist the reader. One or two points arise which conflict slightly with this suggestion put forward. Firstly the old focus of trypanosomiasis in Sapeliga - the most northernly of all the foci - falls outside the present range of G.palpalis. This focus of trypanosomiasis has died out in recent years, in the mid 1940s it was quite important. It is possible that G.palpalis which may have previously occurred in small isolated pockets in this locality has now receded from it altogether. Secondly the mid White Volta focus discovered in 1959 appears to lie to some small extent just outside the palpalis range, but the point is that trypanosomiasis may be most liable to occur where the fly is reaching its end point and consequently may not be easily found at all seasons. More extensive surveys may, in fact, provide a slightly more accurate picture of the distribution of G.palpalis than is given in Map 6.









Where climatic conditions are so severe that they allow only a minimal survival of G.palpalis contact with man may be particularly intimate but transmission of trypanosomiasis would be restricted by the mere limitation of the number of fly available. Without considering the effect of changes in seasons it is obvious that a single fly within a restricted habitat is much less dangerous than a score which were able to survive there. At the other end of the scale where climatic conditions for fly are excellent they are able to roam widely and consequently the degree of repeated contact between man and fly (the recidivistic index of Dr. Saunders) is low. On theoretical grounds alone there should be a point quite close to the limit of the fly where there are sufficient tsetse to give maximum effect, in terms of incidence of trypanosomiasis, to the close man fly relationship existing there. During 1959 the Entomologist in charge of the Tsetse Control Unit has been able to investigate the relationship between numbers of G.palpalis and the incidence of the disease found on the South-east Mamprussi surveys. Graph 2 opposite shows the numbers of G.palpalis caught per month, by Morris traps, and the incidence of sleeping sickness in 10 villages of west Nalerigu in 1957. The village of Timpella, with an incidence of over 30% of trypanosomiasis and with 2-7 G.palpalis per month is omitted. But we must appreciate the overall picture represented in this Graph; large numbers of fly suggest good conditions, this is associated with free movement and consequently with limited man fly contact and here sleeping sickness incidences are lowest; as the conditions become less favourable for G.palpalis their numbers decrease and the incidence of disease rises presumably due to more intimate contact between man and tsetse. What occurs in a particular small locality where fly is least numerous may well be decided to some extent by chance alone. Graphs illustrating the circumstances in other parts of South-east Mamprussi at different times gave, in general, a similar picture.

It is now very necessary to turn from this discussion and present a few facts regarding recent evidence on trypanosomiasis distribution in Northern Ghana.





During 1959 survey work was carried out to ascertain the trypanosomiasis position in some areas that were considered to be potentially dangerous in the event of a general flare up, a continuation of the policy from previous years.

The areas surveyed in 1959 are shown in Map 3 facing page 23 and if the reader has a copy of the Annual Reports of M.F.U. for 1957 and 1958 he will be able to see from previous Maps how the present surveys have continued from those years.

Trypanosomiasis surveys Northern Ghana 1959

<u>Eastern side</u>	<u>Area</u>	<u>Population</u>	<u>Cases</u>	<u>%</u>	<u>Remarks</u>
1. Sapeliga		6,864	13	.19	completing the work in the focus begun in 1958
2. South-east Mamprussi	Bunkurugu Yunyoo	3,740 6,993	22 73	.59) 1.04)	completing original survey in South-east Mamprussi
3. E. Dagomba	Chereponi	3,645	.	.	Lying adjacent to South-east Mamprussi
4. E. Dagomba	Sunson	2,412	3	.12	Upper limit of <u>G.palpalis</u> runs here
5. E. Dagomba	Yendi south	5,058	12	.24)	To ascertain new position
6. E. Dagomba	Bimbilla/ Yendi road	297	.	.	
7. E. Dagomba	Nanumba	34,164	73	.21)	
8. E. Gonja	Alfai	16,101	34	.2)	
9. Kpembe		5,153	30	.58)	
		<u>84,427</u>	<u>260</u>	<u>.31</u>	
<u>Western side</u>					
1. Lawra West		9,276	8	.09)	Areas where sleeping sickness is liable to occur surveys made by ad hoc teams
2. Zini		234	.	.	
3. West Wa		4,382	31	0.7	
4. Mid White Volta		12,343	144	1.17)	
5. Damongo		25	.	.	
6. Wa district		27,786	2	0.007	Observations on routine polyvalent surveys
7. Border surveys	Wa & Tumu	3,466	4	0.12	
		<u>57,512</u>	<u>189</u>	<u>.33</u>	
Total for surveys in Northern Ghana		141,939	449	.32	





In addition cases of trypanosomiasis have been diagnosed and treated at the seven fixed treatment centres in Northern Ghana run by M.F.U., these are shown in Map 1 facing page 9. The itinerant treatment teams also diagnosed a number of cases themselves. Totals from these sources:-

<u>New cases</u>	
Treatment centres	145
Field Treatment teams	<u>35</u>
	180
<hr/>	
<u>Return cases - i.e., old cases requiring further treatment</u>	
Centres	87
Mobile treatment teams	<u>12</u>
	99
	<hr/>

Most of these cases are dealt with at the treatment centres on the eastern side of Northern Ghana at Gambaga and Yendi. Indeed only 29 new cases were diagnosed and treated in all four of the treatment centres in the North West together with 15 return cases. But experience has certainly confirmed the value of these centres as look-out posts provided that they are properly sited.

#### Control measures

Medical control is provided by the treatment of cases diagnosed on surveys, mobile treatment teams follow the survey units, and also by cases attending voluntarily for treatment at the fixed centres. Pentamidine is given to early cases, trypanamide to late. The figures of cases receiving the treatment have been given above - it is extremely rare that a case diagnosed by the survey team fails to take treatment. During recent years also pentamidine prophylaxis has been administered to staff who have been working in areas where the disease is particularly liable to occur; prophylaxis is also given regularly to the staff and patients of the Nkanchina Leprosy Settlement which is near Kpandai on the banks of the river Oti. Details of prophylaxis administered are:-

	<u>Number</u>
M.F.U. staff and families protected	68
Nkanchina Settlement	205

Prophylaxis is maintained at nine monthly intervals.



On the entomological side the Tsetse Control Unit has been very active. The policy of M.F.U. in tsetse control is quite simple; it has been to give attention to those areas where trypanosomiasis is known to be liable to occur, primarily in South-east Mamprussi and on the west side in Wa/Lawra. This work began in the dry season of 1957/58 with the unit operating from Gambaga and a good deal of South-east Mamprussi was dealt with. The programme was continued in the dry season of 1958/59 and by the end of that season in May, 1959, the work in South-east Mamprussi was largely completed but there remained the Bumbuna focus. The Sapeliga focus in Kusasi had also been dealt with. By 1958 it had already been planned to give attention to the old focus in the North West as soon as possible since it was feared that the epidemic which had occurred on the eastern side of Northern Ghana might spread to the west. To this end the Tsetse Control Unit moved from Gambaga to Wa in mid 1959 to carry out a reclearing programme there, the completion of the work in South-east Mamprussi being carried out by staff left in Gambaga. In 1959 it has also been necessary to give some attention to a few points in the mid White Volta area and limited clearing is also being made in Kpembe, at the fourth focus. Control is provided by the system of selective clearing introduced some years ago by Morris. Insecticides have not been used so far except on a very small and experimental basis.

It cannot be over emphasised that the policy in tsetse control is to restrict activities to those areas where trypanosomiasis is found at significant rates or where experience tells us that it is liable to occur. To these areas, together with the major ferry points, clearing will be limited. Furthermore it seems very likely, in view of the fact that important trypanosomiasis foci may be entirely dependent on G.palpalis, that we might be spared all clearing work, save at ferries, in the large part of Northern Ghana where of the riverine tsetse G.tachinoides is found alone. Once these relatively limited clearings have been made - and most of this work should indeed be completed in another year or so - maintenance must be continued indefinitely. Clearings made since 1957 have already been reslashed annually.

The clearing work of the Tsetse Control Unit in 1959 will be briefly summarised.





It has already been pointed out on page 26, in the summary of the Tsetse Control Unit's work for 1959, that as far as tsetse clearing and control is concerned the calendar year is divided into three parts, dry, wet and dry seasons. As clearing work is carried out in the dry season one period of activity or programme begins at the end of one year and continues for a few months into the next consequently it is, to say the least, inconvenient to write up the work in relation to one year alone; and it is hardly possible to do so without causing confusion.

The type of work done falls under three heads.

"Clearing" refers to the first removal of all fly belt species.

"Reclearing" refers to rehabilitation of old clearings made by the former Department of Tsetse Control which were later left and in which regrowth has occurred and become quite thick.

"Slashing" refers to annual work done in all clearings and reclearings to remove all regrowth, carried out by a gang of labour moving along a clearing at about walking pace and cutting off all regrowth which has occurred during the last twelve months.

The work of 1959 is summarised under these three headings.

#### Clearings

These were principally carried out in South-east Mamprussi in continuation of the programme started earlier. During the dry season November, 1958 - May, 1959 over 170 miles of stream system were cleared. The lower end of the various streams of South-east Mamprussi (which were cleared from the headwaters) were protected by mile long barrier clearings. In addition clearing of the last 8 miles was completed in the Sapeliga focus of Kusasi. At the end of 1959 we were giving assistance to the Forestry Division of the Ministry of Agriculture in clearing the Red Volta in the Nangodi and Sekoti Forest reserves, M.F.U. providing technical supervision. Also on the east side work was begun towards the end of the year in clearing the river Oti opposite the Kpandai Leprosarium. In the mid White Volta area clearings were also begun in November at the Daboya-Mankarago road crossings of streams. The clearing begun in 1958 at Buipe ferry was completed.



In the North West in the area we mean to render fly free, from Wa to Hamile, it would appear that only one stream, the Orifani has not previously (1937-1957) been cleared. Work was begun on this in 1959.

#### Reclearing

It will be remembered that the major effort of the Tsetse Control Unit in the dry seasons 1957/58, 1958/59 was in making "clearings" in the North East, in the old foci of trypanosomiasis particularly in South-east Mamprussi.

In 1959/60 and perhaps for another year most attention will be given to "reclearing" the North West (Wa/Lawra) - reclearing because these districts were "cleared" between 1937-1957 (except the Orifani see above). During 1959 the programme was well started, attention being directed first to the Kamba, Boundary and Seilo/Tuni rivers.

#### Slashing

The clearings made since 1957 in South-east Mamprussi were maintained by slashing; this operation was performed also in Sapeliga.

By tradition costs of the anti-tsetse work are usually given - the figures are for the dry season 1958/59.

180 miles of "clearing" in the North East cost £21,500  
i.e. £120 per mile

40 miles of "reclearing" in the North West cost £1,106  
i.e. £37 per mile

207 miles of "slashing" in the North East cost £3,765  
i.e. £17 per mile.

This latter may appear to be much larger than can be accounted for by "a gang of labourers proceeding at walking pace" and is largely due to the heavy cost in slashing on two or three streams. It is expected that as the slashing is repeated annually costs will fall to about £5 per mile, a figure already obtaining over some of the area.





### Results achieved by control measures

The results of the control measures, medical and entomological, which have been applied in Northern Ghana could best be seen by comparing the state of the disease in an infected area before and after. In recent years such resurveys have been made of parts of South-east Mamprussi and these, which gave a satisfactory picture, have been described in previous reports. In 1959 it was not possible, in view of our commitments, nor absolutely essential, in view of recent experience, to make a further resurvey in Mamprussi. The three additional outbreaks in mid White Volta, Kpembe and West Wa have only recently come to light and the areas will be resurveyed in due course.

Consequently in 1959, the efficacy of control can only be measured somewhat indirectly in those areas which have been subjected to anti-tsetse clearings; some examples are given below:-

#### Pre and post clearing fly counts

Counts on each river are on the basis of the same number of fly boy/days, (given in parenthesis)

<u>South Mamprussi</u>		<u>Mean pre-clearing count</u>		<u>2nd post clearing count</u>		<u>3rd post clearing count</u>	
		<u>1957-58</u>		<u>dry season 1959</u>		<u>rains 1959</u>	
<u>River</u>		<u>palp.</u>	<u>tach.</u>	<u>palp.</u>	<u>tach.</u>	<u>palp.</u>	<u>tach.</u>
Zango	( 5 )	68	2	0	0	0	0
Goabulu	( 5 )	75	35	0	0	0	0
Salga	(10)	439	151	1	1	0	1
Nassissi	(12)	196	29	0	2	0	2
Nawango	( 6 )	127	22	1	1	1	0
Duakuluga	(10)	283	31	0	0	0	0
				<u>Immed. post clearing count</u>		<u>1st post clearing count</u>	
		<u>1958-59</u>		<u>1958-9</u>		<u>1959</u>	
Yuri	( 2 )	101	32	-	-	0	0
Nyankgari	( 3 )	13	5	-	-	0	1
Kologsibuluga	( 3 )	159	25	-	-	0	1
Bonkuluga	( 3 )	140	31	11	0	0	0
Tintanga	( 3 )	42	8	8	1	0	0
Togbini	( 3 )	28	3	9	0	0	0
Bimbago	( 3 )	69	6	-	-	-	-

These results are particularly encouraging and when the next trypanosomiasis surveys are carried out in these areas it can be confidently expected that few cases will be found, no more than can be explained by relapse of infections or by some cases having been missed at earlier surveys. The Entomologist in charge of the Tsetse Control Unit estimates that fly populations have, on these figures alone, been reduced by 99.5% but that it may be greater since the post clearing counts probably represents a greater percentage of the fly than did pre clearing counts.





(b) The position in the rest of Ghana

In the rest of the country covered by M.F.U., that is to say all Regions except the South West the picture of trypanosomiasis is fairly well known. In Ashanti the distribution pattern<sup>is</sup> linear, along the major roads. In the South East, as far as our investigations have gone (over 40,000 people have been examined on surveys and no case has been found) the disease appears to be rare. In the Volta Region it occurs at low rates in the north, this lying next to Northern Ghana, but is extremely rare in the south. All these three units have been concerned with large scale yaws campaigns in 1959, particularly in Ashanti and Volta Region, nevertheless it has been possible to provide staff to investigate trends in Ashanti, this indeed being very necessary as it is essential to keep an eye on the position in view of the present state of affairs in the north. The indications are, fortunately, that trypanosomiasis in Ashanti has not yet been much affected by the new circumstances in the north, there has been little or no effect in the northern part of the Volta Region and, of course none in the South-East Region of Southern Ghana. No comment on the epidemiological picture of the disease in Ashanti and Brong Ahafo is needed; this has already been described and there is no change of opinion.

The localities in which surveys were carried out for trypanosomiasis in these Regions in 1959 are indicated in Map 3 facing page 23. The results are shown:-

Ashanti

<u>Area</u>	<u>Population</u>	<u>Cases</u>	<u>Incidence</u> %	
Kintampo	15,633	3	.02	ad hoc
Yeji	3,114	5	.16	} by treatment centre staff going out
Ejura	5,596	14	.25	
Kumasi	171	.	.	
Edudwan	756	12 <sup>*</sup>	1.6	By Epidemio- logical Division
Persons crossing Yeji ferry	8,181	32	.4	
	<u>33,451</u>	<u>66</u>	<u>.2</u>	

\*This figure represents the total number of cases found in the Edudwan locality during several surveys in the population of less than 800. The incidence shown, therefore, is more properly described as the attack rate r.a.





Volta Region

<u>Area</u>	<u>Population</u>	<u>Cases</u>	<u>Incidence %</u>
Banda Town	3,314	3	.09

South-East Unit

Dawa area	30,471	0	0
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In addition there are 4 treatment centres in Ashanti/Brong Ahafo, and one (at Kete-Krachi) in the Volta Region and one at Koforidua in the South East Region - this latter has only recently been opened and has seen no case of trypanosomiasis so far.

The cases diagnosed by the fixed centres in 1959 were:

New cases	183
Return cases	109

Medical control is as in Northern Ghana, by the immediate treatment of cases diagnosed. In addition the Ashanti Unit gives prophylaxis to the ferry staff at Yeji and Morno biannually, in this way 115 persons were thus protected.

No anti-tsetse measures were carried out in these areas during 1959 except reclearings and slashings of the clearings already made at the ferry crossings, Bamboi, Morno and Yeji.

During 1959 M.F.U. undertook the compilation of trypanosomiasis notifications for the whole of Ghana. Principal Medical Officers keep us advised of notifications within their Regions and every quarter a consolidated return is sent to the Ministry. In addition to the new cases diagnosed by M.F.U. and already shown in this Report 47 others were reported by Principal Medical Officers since June when this new arrangement began. Graph 1 therefore represents the total of the new cases found throughout the country in 1959.

/45.....



(c) The results of treatment of cases of trypanosomiasis

From time to time it is very desirable to determine the success of the standard treatment given to trypanosomiasis cases. In normal field practice as soon as a patient has completed his treatment (often less than 2 weeks in the early cases) he disappears from the ken of M.F.U. for although he is advised to return subsequently for further examination he rarely does so. And moreover since a case of trypanosomiasis cannot be pronounced as cured until a considerable time has elapsed after he has taken his treatment it is obvious that unless an effort is made to follow up cases the effects of the treatment given cannot be precisely known. Follow up examinations often meets with considerable difficulties, the disease tends to occur in the remoter parts of the country where communications are not so good and in any event generally prevails at low rates so that a wide area has to be covered to include a sufficient number of cases. The population is also given to moving about, and after 18 months many of the cases may have left the area in which they were diagnosed, either permanently or temporarily, so that in the normal course of events a follow up operation is time consuming and at best may provide results which are difficult to interpret since more often than not a relatively large number of the old patients cannot be traced.

The recent outbreak in South-east Mamprussi afforded an unusually good opportunity to follow up a large number of patients after treatment, this could be done fairly readily from Gambaga. It was more than ordinarily important to do so as the Annual Report of 1957 of the West Africa Institute for Trypanosomiasis Research had raised some slight doubt about the value of pentamidine in the treatment of early cases.





The results are given below.

In a particular group of villages it was decided to follow up all cases of trypanosomiasis treated with pentamidine. There were 141 in all; these infections had been diagnosed by survey teams between February and April, 1958 by the discovery of trypanosomes in the blood or gland juice. A standard treatment of ten daily injections of pentamidine (4 mg. per kilo) had been given between February and May, 1958. Before this had been carried out C.S.F. examination had been made on all cases (with seven exceptions); the patients had been classified as in the early stage on the grounds that cell and protein content of the C.S.F. had been less than 30 per c.mm. and 22 mg. percent respectively. The follow up investigation was carried out about 18 months later, in August/September, 1959.

At this follow up of the 141 cases treated

3 had died

one, a girl aged 14 died 3 weeks after treatment two others, both infants, had died sometime after treatment. From the history given it seemed very possible that causes other than trypanosomiasis had been responsible (? measles).

2 had left the district and there were no reliable reports of them.

10 others were not seen but they were reported as being well though these reports may not have been completely reliable.

5 others were not seen but were very reliably reported as being well.

121 were seen and examined. On questioning almost all patients said they felt well, a very few complained of headaches; but the value of this sort of history is very questionable; one man for example stated that he felt well but was observed to be sleeping excessively and trypanosomes were found in the C.S.F. In appearance only a few patients showed abnormalities, one had a tremor, two were noticeably very thin and a small child was seen in a convulsion but these conditions may not have been related to their previous infection with trypanosomes. In none of the 121 patients could peripheral trypanosomes be found, and only in one of the 112 on whom lumbar puncture was performed were trypanosomes found in the C.S.F., this was the case referred to above.



As already described the 141 patients were treated with pentamidine as they were considered to be in the early stage of infection, showing no late manifestation, and having C.S.F. findings of

less than 30 cells per c.mm.

less than 22 mg. percent protein.

In recent years W.A.I.T.R. has provided a very useful grading of trypanosomiasis into three stages based on C.S.F. findings, viz:-

- |                                       |   |
|---------------------------------------|---|
| i. First stage - early cases          | With 3 cells or less per c.mm., and 25 mg. percent or less total protein.   |
| ii. Second stage - intermediate cases | With either or both these readings raised above 3 cells per c.mm. and 25 mg. percent total protein, but below 40 cells per c.mm. and 40 mg. percent total protein respectively. |
| iii. Third stage - advanced cases     | With either or both readings raised to or above 40.   |

In due course it is hoped to base treatment in M.F.U. on this classification but the change over in a large organisation will take time.

It is, however, simple enough to classify cases treated by M.F.U. according to the W.A.I.T.R. scheme and this has been done; it allows a more critical measure of the effects of treatment than is obtainable from using our own two groups.





The table below represents the results of treatment.

141 cases in M.F.U. early stage treated with pentamidine and followed up 18 months later. Classified by findings on the C.S.F. before and after treatment using W.A.I.T.Rs. three stages.

<u>Pretreatment</u>		<u>Post treatment</u>			
		<u>W.A.I.T.R. stages</u>			<u>No lumbar puncture</u>
<u>W.A.I.T.R. stage</u>	<u>Number of patients</u>	<u>1</u>	<u>2</u>	<u>3</u>	
1	34	18	11	0	5
2	100	47	32	3	18
3	-	-	-	-	-
?i.e. no lumbar puncture	7	1	0	0	6
	<u>141</u>	<u>66</u>	<u>43</u>	<u>3</u>	<u>29</u>

Of the 11 who passed from W.A.I.T.R. (1) to W.A.T.R.(2) the highest cell count among them on follow up was 9 per c.mm., certainly not a very serious state of affairs and the average of the C.S.F. findings for these eleven patients 18 months after treatment was:-

5 cells per c.mm.  
20 mg. protein percent.

Of the 32 out of the original 100 in W.A.I.T.R. stage 2, who remained in that group after treatment the total cell count per c.mm. fell from 314 to 224, the average cell count per patient from 10 to 7. Indeed not a single case would have been regarded as passing into M.F.U. late stage based on criteria of cell count alone (more than 29 per c.mm.) and only two of these 32 had more than 22 mg. protein %).

Trypanosomiasis reduces fertility and it is relatively rare for an infected woman to produce a full term child. In the follow up particular attention was paid to gathering information from women patients of child bearing age on the subject of pregnancy, abortion or miscarriage since their treatment; the findings support the evidence given above that both from clinical and laboratory observations there appeared to be little serious effect of the infection left in this group of persons 18 months after treatment.



The opportunity was taken at the same time to follow up the results of treatment given to late cases, persons who had been in the later stages of infection when diagnosed, having shown C.S.F. readings of either 30 or more cells per c.mm. or over 22 mg. protein percent or who had shown some of the later manifestations of the disease. These cases were treated with tryparsamide, a group of 116 was followed up. The original survey which discovered the cases was made between September, 1957 and April, 1958; the follow up investigation was carried out in August and September, 1959.

Of the 116 cases only 93 were found at the follow up.  
Of the 23 not seen

2 had died (one during treatment nearly 2 years previously)

21 were absent and of these all except 1 were reasonably reliably vouched for as being alive and well.

Of the 93 seen and examined only one had a peripheral infection with trypanosomes in the blood (C.S.F. 3/.24). Lumbar puncture was performed in 79, no trypanosomes were found.

The results of tryparsamide treatment of late cases based on C.S.F. findings using W.A.I.T.Rs. classifications are given below:-

<u>Pretreatment</u>		<u>Post treatment</u>			
<u>W.A.I.T.R.</u> <u>stage</u>	<u>Number of</u> <u>patients</u>	<u>W.A.I.T.R. stage</u>			<u>Unknown</u>
		<u>1</u>	<u>2</u>	<u>3</u>	
1	.	.	.	.	.
2	77	27	27	1	22
3	<u>39</u>	<u>6</u>	<u>17</u>	<u>1</u>	<u>15</u>
	116	33	44	2	37 2 dead
	<u>116</u>	<u>33</u>	<u>44</u>	<u>2</u>	<u>21</u> absent
					14 no L.P.

It is not easy to give an accurate assessment of the results of treatment where such a large proportion of those included in the follow up scheme are away or where, for one reason or another, lumbar puncture examination cannot be carried out in a considerable element among those seen. The death rate among late cases, however, is undoubtedly very low, this feature has been commented on in previous reports.





Secondly the general response to treatment, as gauged by the C.S.F. findings, was not unsatisfactory but but it was noted once again that a few patients on follow up exhibit evidence of cerebral involvement, a tendency to dullness or the expression of silent grief so excellently recorded by Mac Pherson, without showing gross changes in the C.S.F. The criteria of the C.S.F. therefore may be less useful in dealing with late cases where some degree of equilibrium may have been established between host and parasite.

In general it can be said that the results of treatment with tryparsamide are at least very fair; but it must be borne in mind that we appear to have been dealing with a relatively mild form of the disease in recent years.

(iii) Summary and comment

1959 has seen a continuation of the policy of searching for trypanosomiasis in those areas where the natural history and behaviour of the infection would suggest that it is likely to recur.

The epidemic which was discovered in the north from 1956 has possibly been defined, though there may be unpleasant surprises to come. It certainly seems to be receding on the east side due to the control measures and one hopes that in the west we have got ahead of its advance. So far the events in the north appear to have had very little effect in Ashanti and Brong Ahafo and none elsewhere.

The work of 1959 can be summarised as follows:-

Field investigations

	<u>Persons examined</u>	<u>Cases</u>	<u>Incidence %</u>
Northern Ghana	141,939	449	.32
Ashanti & Brong Ahafo	33,451	66	.2
Volta Region	3,314	3	.09
South East	30,471	.	.
	<u>209,175</u>	<u>518</u>	<u>0.25</u>

Centre cases

Northern Ghana	180
Ashanti, Brong Ahafo, Volta Region and South East	183
Total new cases treated	881
Old cases needing further treatment	<u>208</u>
Total treated	<u>1,089</u>



To the total of 881 new cases found by M.F.U. in 1959 must be added 47 cases reported by Principal Medical Officers (it is assumed that these were all new and none were old cases relapsing), giving a total of 928 cases for the year in Ghana. It is this figure which is shown in Graph 1 facing page 29.

It will be seen from Graph 1 that there is no sharp increase of the number of cases since 1957 though there has been much talk of an epidemic occurring in Northern Ghana in the last two years. The explanation of the apparent paradox is quite simple. Firstly the original outbreak of the 1930s had ultimately far reaching effects in many parts of the country, particularly in Ashanti and Brong Ahafo; these effects have been continuing to dwindle during recent years - for example the number of new cases treated at the M.F.U. centre near Kumasi in 1950 was over 300 whereas in 1959 only 72 were diagnosed. The tide mark of cases for the whole of Ghana in 1959 would have been very much lower, Graph 1 would have continued downwards, had there been no recent outbreak in the north. Secondly the epidemic has, except for South-east Mamprussi, been on a small scale, but a minor outbreak in one year might lead to a major epidemic in the next. No one can be complacent about a steadily maintained overall number where it is known that in some areas the disease is declining rapidly, for this can only mean that there is a compensatory increase in other quarters and if this is taking place in the primary foci of infection it is particularly serious.

It can hardly be supposed that the recent trends of events discovered in Ghana are limited to this country; experience shows that this could not be expected yet nothing is heard of an increase of infection having been observed in neighbouring countries. Perhaps there are increases but they have not been discovered or news of them has not reached us; it would be extremely interesting to know what is going on around Ghana. If, in due course, outbreaks were discovered in neighbouring countries we should certainly not accept that they had originated here simply on account of our having detected the position at an early stage.

Much of what is written in this section should appear in papers in due course.





## 2. Yaws

### (i) Introduction

By far the largest single undertaking of M.F.U. in 1959 has been, as in recent years, in a mass campaign against yaws.

In order that the report of the years work should be comprehensible a restatement of the history of yaws control in Ghana must be given, very briefly.

#### Pre 1944

Yaws treatment (and ? control) through administration of bismuth and arsenic to cases attending at hospitals and clinics.

#### 1944

An ad hoc organisation was set up to control the disease. Teams moved systematically through a district finding and treating cases. Action limited to part of Eastern Dagomba where the disease was most serious.

#### 1946

Staff of the yaws campaign merged with the Trypanosomiasis Campaign.

#### 1953

Penicillin replaced bismuth and arsenic in the routine treatment of cases found by M.F.U. polyvalent survey teams.

#### 1954

M.F.U. formed ad hoc mass control teams which began again to operate in Eastern Dagomba using penicillin.

#### 1955

WHO/Unicef assistance provided for yaws control, to be implemented by the operation of the normal polyvalent survey teams.

#### 1956.

A new Plan of Operations against yaws drawn up with WHO and Unicef. Programme to cover Northern Ghana and Volta Region and to be carried out by ad hoc teams. Work began in Northern Ghana.

#### 1957

Work began in Volta Region. A second Plan of Operations drawn up to cover Ashanti/Brong Ahafo.

#### 1958

Work continued in Northern Ghana and Volta Region and began in Ashanti/Brong Ahafo.

#### 1959

Completion of 1st Plan of Operations in Northern Ghana and Volta Region and assessment of the results achieved. Continuation of 2nd Plan of Operations in Ashanti/Brong Ahafo. Third Plan of Operations drawn up for yaws control, this time in the Eastern Region and work initiated at the end of the year.





(ii) The WHO/Unicef/Ghana campaigns against yaws

In order to make quite sure that all readers can follow this section it is necessary to reiterate a small section of page 9 of this Report. "In this work all persons in the Regions are examined for yaws during the course of the Initial Treatment Survey and given at the same time an injection of penicillin, those who show no outward sign of the disease are given half the dose administered to cases. Resurveys are made at half yearly intervals on three occasions and further treatment given ~~as~~ necessary".

W.H.O. recommends that mass survey and treatment for yaws should be carried out (by itinerant teams) until the incidence of yaws falls to 2% and the incidence of infectious yaws alone to 0.5% (In Ghana we assumed that this might generally be achieved by the Initial Treatment Survey and the three resurveys and these became standard practice). W.H.O. also considered that rural health services, which should be built up whilst the yaws campaign proceeds, should be able to provide such continuous control as is required thereafter. In other countries it would appear that the organisation responsible for the mass campaign against yaws generally has little or nothing to do with long term control, this duty being handed over to others. But this is not without grave risks. Control of the disease is a continuous operation; knowledge acquired on the mass surveys regarding the natural pattern of the distribution of the infection may be completely wasted if another organisation takes over in the later stage and this knowledge will be essential in determining long term control policy. In Ghana it therefore seemed very desirable that M.F.U. should continue to take responsibility for knowing the position regarding yaws in those areas which have already completed mass treatment and for applying such further control as is necessary even after the results recommended by W.H.O. as desirable (less than 2% yaws and 0.5% infectious yaws) had been achieved. Unless there is some form of organised and centrally controlled long term surveillance for yaws after the so called mass campaigns have been completed there is a real risk that the infection will rise again, particularly in those areas which are most suitable for transmission. If this occurred much of the effort and the expense of the mass treatment will have been wasted.





In those localities where the Initial Treatment Survey and three six monthly resurveys have been insufficient to reduce total yaws incidence below 1% and infectious yaws incidence below 0.2% (cf W.H.O. recommendations of 2% and 0.5% respectively) we have implemented a policy of continued resurveys at intervals of about 9 months giving such mass treatment as needed. There have been a few of these black spots in Northern Ghana, and two very distinct foci in the Volta Region. The demands of this work in terms of staff are far less than might be thought likely. Furthermore where the incidences at the time of the last resurvey were below these figures selected by M.F.U. the following policy of resurveys is being introduced:-

<u>Percentage of yaws on last resurvey</u>		<u>Next resurvey i.e. long term surveillance</u>
<u>Infectious</u>	<u>Total</u>	
0.2%	1%	in 12 months time
0.1%	0.5%	in 18 months time
0.05%	0.2%	in 24 months time
0.02%	0.1%	in 36 months time
Less than 0.02%	0.1%	Not necessary.

(Dr. Von Haller's proposal at a meeting of M.F.U. Medical Officers in May, 1959).

It is generally considered that a mass campaign against yaws is concluded when the incidences recommended by W.H.O. have been reached and the organisation responsible for this work has withdrawn and handed such further action as may be thought necessary to another body. It is, presumably, at this stage that W.H.O. and Unicef cease to require reports on yaws control. But in Ghana M.F.U. continues in action indefinitely with periodic long term surveillances; it does not appear to have been decided whether quarterly reports on this particular work are expected of us. Rationally they should not since the "campaign" or mass control stage recognised by the international bodies has been concluded before we implemented the long term surveillance.











MAP 7. SHOWING LOCALITIES IN WHICH YAWS CAMPAIGNS WERE CARRIED OUT IN 1959.



Initial Treatment Survey only	
Resurveys only	
Initial Treatment and Resurveys	
Long Term Surveillance	

(a) Progress in 1959

1st Plan of Operations

Northern Ghana

The present state of the campaigns in the various Regions is shown on Map 2 facing page 10 and in Appendix 2 at the end of the Report. The actual work done in 1959 in terms of ground covered is indicated on Map 7 opposite.

It will be seen on Map 2 that the work of the campaign in Northern Ghana was completed in 1959 with the exception of two areas which are left blank on the map. One in the north east (Kusasi, Frafra and Navrongo) and another in the north west (Lawra). These gaps require an explanation. The Lawra district was excluded from the Plan of Operations since it had been covered in the 1955 plan, treatment being given by polyvalent survey units. In Kusasi and Frafra yaws incidence is so low that these areas could not justifiably be included in the Plan, and in Navrongo the incidence was low on the east side but higher towards the west where it borders Tumu and provision was subsequently made outside the Plan to deal with this locality.

The only work which remained to be done in Northern Ghana in 1959 in the standard mass campaign was the completion of the final resurvey in the whole of the Tumu and Western Gonja districts and a small part of Tamale urban district. The findings were:-

<u>Area</u>	<u>Population examined</u>	<u>Cases</u>		<u>Incidence %</u>	
		<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
All Tumu	21,717	8	539	.04	2.4
All W. Gonja	40,058	44	1,030	.11	2.7
Part Tamale	2,676	3	2	.11	.2
	<u>64,451</u>	<u>55</u>	<u>1,571</u>	<u>.08</u>	<u>2.5</u>

It became clear towards the end of 1958 that, in the North West, teams were probably overdiagnosing non-infectious yaws cases and a special team was formed under the Medical Officer, Volta Region (Dr. Von Haller) to look into this. At this time the North West Unit had no Medical Officer. The conclusion reached was that such a natural error was occurring





but it was probably small. Consequently we have tended to take as our yard stick of the success of the campaign in the North West the final incidence of infectious yaws rather than total yaws. The figures relating to the North West given in the table above show that for Tumu and Western Gonja together infectious yaws was less than 0.1% and total yaws was over 2.5%.

### Volta Region

Before listing the work of the Volta Region Unit on the yaws campaign in 1959 it is necessary to make two points. In the first place in one or two survey areas it has been possible to omit some of the resurveys on account of a low incidence of infection having been found at the time of the first resurvey, or more rarely at the Initial Treatment Survey. In each area however an I.T.S. has been made and at least one resurvey. The final resurvey of all areas are grouped together under the last resurvey heading, in most cases this was in fact the third re-examination, but in some instances it was the second and in a few the first. This explains how it was possible to have been engaged on an I.T.S. programme in 1959 and during the same year to have finished the follow up examinations; it happened that the 1959 I.T.S. was performed in areas where yaws was unusually light. Secondly, this campaign has shown a very distinct pattern in public co-operation. At first the teams were unable to obtain an adequate coverage of the population in some localities but this improved considerably as the campaign progressed. In the same vein we encountered great fluctuations of population in parts of the Region arising out of the periodic cocoa harvests, a circumstance which influenced the success of the work by the introduction of the infectious cases. The work of 1959 is shown below:-

<u>I.T.S.</u>		<u>Cases</u>		<u>Incidence %</u>	
<u>District</u>	<u>Pop. examined</u>	<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
Keta	14,798	10	223	0.07	1.5
<u>1st resurvey</u>					
Keta	121,073	413	3,143	.34	2.8
<u>2nd resurvey</u>					
Keta/Ho	186,067	499	3,163	.27	2.0
<u>3rd and additional resurveys</u>					
Keta/Ho	599,046	824	6,706	.14	1.1





Total examinations made in Volta Region	920,984	
Infectious cases found and treated	1,746	} 14,989
Other cases found	13,235	

### 2nd Plan of Operations

#### Ashanti and Brong Ahafo

The work of the I.T.S. was continued in 1959 in these Regions. Towards the end of the year the speed of this work was seriously curtailed in the survey areas of Bechem/Teppa and Ahafo. In these districts during very recent years there has been a considerable increase in population due to immigration from other parts of the country; but these people are not settled in the old established villages but have moved out well beyond these into previously untouched forest. Here they are clearing the ground and planting cocoa, each family or group taking a large tract of forest and building a compound somewhere on his own land. The consequence of this economic development is a fairly large but widely scattered population spread over a great area which, from the point of view of settlements, is unmapped; the country is undulating and there are no roads. A yaws team of two might be expected to deal with a population of 200-400 per diem while working under conditions normally found in Ashanti; in Ahafo teams average about 20-40 a day and this is only achieved as a result of much walking (cycles cannot be used), circumstances which are not very encouraging for field staff. These conditions are somewhat similar to those prevailing in parts of the Volta Region. We are now taking particular care to ensure that as far as possible not a single household is missed although on reflection this policy sometimes appears to have been followed at a considerable cost in man hours.

Routine resurveys have been made during the year but it has often been possible and indeed desirable to curtail these in view of the relatively low incidence of yaws prevailing after the I.T.S. Because of this the whole of the unit was engaged only on I.T.S. work for a considerable period towards the end of the year.



I.T.S.

<u>Area</u>	<u>Population examined</u>	<u>Cases</u>		<u>Incidence %</u>	
		<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
East, central and West Ashanti	279,574	1,277	9,254	.45	3.8

1st Resurvey

North West Ashanti	117,434	362	8,845	.31	7.8
North East Ashanti	98,792	213	3,479	.22	3.7
	<u>216,226</u>	<u>575</u>	<u>12,324</u>	<u>.27</u>	<u>6</u>

2nd Resurvey

North West Ashanti	78,319	273	2,577	.35	3.6
North East Ashanti	403	1	.	.25	.
	<u>78,722</u>	<u>274</u>	<u>2,577</u>	<u>.35</u>	<u>3.6</u>

3rd Resurvey

North West Ashanti	38,556	56	1,352	.15	3.6
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Total examinations made in Ashanti/Brong Ahafo	613,078				
Infectious cases found and treated				2,182	} 27,689
Other cases found				25,507	

3rd Plan of Operations

South East Region

Work in the campaign against yaws was only begun in the last few weeks of the year, the teams operated first in the Aburi and Nsawam areas.

I.T.S.

<u>Area</u>	<u>Population examined</u>	<u>Cases</u>		<u>Incidence %</u>	
		<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
Aburi/Nsawam Mangoasi	53,507	718	4,901	1.34	10.5

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(b) Summary of the results achieved in the  
campaigns concluded in Northern Ghana  
and Volta Region

Northern Ghana, excluding Lawra, Nawrongo, Frafra and Kusasi districts (see above), and the whole of the Volta Region have been covered by a mass campaign against yaws beginning in 1956/57 and concluded in 1959. This campaign has consisted of an I.T.S. and 3 resurveys, though in some areas of the Volta Region all three resurveys were not required. In general the result of this work has been to reduce the incidence of yaws to the level below which W.H.O. considers that mass campaigns are no longer necessary.

It is absolutely essential to make an immediate post campaign assessment of the results achieved and this has been done in some detail for the Northern Region in a full report that has already been issued. For the Volta Region the Medical Officer in charge (Dr. Onori) has recently provided a comprehensive review of the campaigns achievements there and this will be issued as soon as possible.

For the purpose of this Annual Report for M.F.U. for 1959 it is not possible to do more than indicate the main features of the results achieved in Northern Ghana and Volta Region; these are briefly summarised below.

Northern Ghana

1948 census population of districts included	
in the Plan (see Map 2)	502,650
Number of persons examined on I.T.S.	530,685
1st Resurvey	499,565
2nd Resurvey	504,539
3rd Resurvey	521,305
Total examinations made in this campaign	
for yaws in Northern Ghana	<u>2,056,094</u>

On the east side, in all districts but particularly in Eastern Dagomba, the numbers of persons seen at the resurveys increased as time went on; in the North West, on the other hand and especially in the Wa district the population attended less well as the campaigns progressed e.g.

	<u>I.T.S.</u>	<u>3rd Resurvey</u>
Eastern Dagomba	135,208	160,624
Wa	100,000	54,154



Though it is difficult if not impossible to generalise regarding population coverage it seems fair to say that public co-operation was generally sufficient to ensure success of the campaign. Anyone accustomed to field work knows very well the difficulties that are met in obtaining full support from the population where surveys are repeated at not infrequent intervals particularly in that element of the population least affected by the condition being controlled, adults in the case of yaws.

The following table summarises the results of the campaign.

	<u>Persons examined</u>	<u>Yaws cases</u>		<u>Incidence %</u>	
		<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
I.T.S.	530,685	7,950	42,198	1.5	9.44
3rd Resurvey	521,305	1,006	5,375	.19	1.22

This table, of course, gives no indication of the different states of affairs existing before and after the campaign in the several survey areas; this can only be seen by referring to the larger report where full tables and informative maps are presented. Nevertheless the table does give a general indication of the results achieved, in particular how the incidence of total yaws and infectious yaws alone were reduced below the line advised by W.H.O. (2% and .5%). There were a few foci of infection, particularly in the North East where in spite of the standard type of I.T.S. and three resurveys yaws remains at a relatively high rate. As already explained these areas have been subjected to additional resurveys.

#### Volta Region

A summary of the yaws campaign results are given.

1948 census of population	488,755
Number of persons examined on I.T.S.	454,928
1st R.S.	439,280
2nd R.S.	437,042
3rd or last R.S.	588,380
Total number of examinations made	1,919,630





The explanation of a high figure in the last resurvey has already been given; firstly it is due to improved co-operation of the public, and it is relatively high when compared with 1st and 2nd resurveys owing to the fact that some localities had only an I.T.S. and one (a final) resurvey - see above.

	<u>Persons examined</u>	<u>Cases found</u>		<u>Incidence %</u>	
		<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
I.T.S.	454,928	5,542	33,924	1.2	8.6
Final Resurvey	588,380	993	8,977	.17	1.7

Again this brief summary masks completely the variation in yaws distribution and response to the campaign in the different districts but it does indicate that the overall results achieved was equal to that advised by W.H.O. as desirable.

Two major residual foci of infection were left after the campaign, one in the extreme north of the Region covering a wide area and a second and less extensive one in the south east. Both residual foci in Volta Region and most of those in Northern Ghana which are of any consequence lie in apposition to the frontier.

A careful check is, of course, kept on all penicillin issued and used in these campaigns. In the Volta Region some 91,000 vials were issued to and used by the teams; and the records show that 1,010,838 ccs. of pam were administered. But it is unfortunate that vials do not contain an exact amount, the variations of their contents are too great to allow use to be made of the volume in checking. It is regrettable that no precise formula can be worked out to reconcile issues of pam (made in vials) and administration (recorded in ccs). One vial contains on an average 11 ccs. pam, an adequate figure for the purposes of estimating needs etc. but not sufficiently accurate for day to day checking of pam usage in the field.



(iii) Long term surveillance and control

During a mass campaign the standard practice has been to cover all districts on four occasions, the I.T.S. and three resurveys. There have been slight variations in this, for example some of the areas in Volta Region were relatively lightly infected with yaws and they escaped one or two of the resurveys. On the other hand in a few of the areas, where yaws is particularly prone to occur, it has been necessary, and possible, to mount 4th and even 5th resurveys during the period that the "campaign" in the Region was still being conducted.

There comes a time, however, when the "Mass Campaign", for the purposes of fulfilling our obligations with the international bodies, is considered as having been concluded. In general the stage has been reached about 3 years after the campaign begins giving time for the I.T.S. and 3 resurveys to be made in all areas. By this time, almost without exception, all the areas (into which the Regions have been divided for the purpose of the work) have shown incidences below that recommended as indicating the end for the need of mass means of control viz 2% total yaws and 0.5% infectious yaws. Indeed most areas at the conclusion of the mass campaign showed incidences of less than 1% and .2% respectively, the standards set by M.F.U.

As already explained the procedure usually adopted in other countries for the continuation of yaws control once the mass campaign is over is to leave this to the fixed established rural medical services. For one reason or another it is felt that this step might be premature in parts of this country and M.F.U. has therefore decided to continue surveillance for yaws on the lines indicated in the table on page 54.

In 1959 this policy of long term surveillance was begun in the North, on the east side in the main residual foci of infection.

	<u>Persons examined</u>	<u>Cases</u>		<u>Incidence %</u>	
		<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
Eastern Dagomba } Eastern Gonja }	38,412	153	632	.5	2

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(iv) Other anti yaws work carried out in 1959

No opportunity is lost to treat cases of yaws which may be found in the course of M.F.U's several activities. Every case diagnosed in the course of a polyvalent survey (which of course does not form a part of the recognised yaws campaign) is dealt with and contacts are treated as necessary. The ad hoc teams surveying for bilharziasis now also examine the school children from whom specimens are collected and those with yaws are given treatment on the spot. In addition the North East Unit carried out a limited resurvey and treatment of cases on the western side of the Navrongo district where we had made an extra-Plan-Ops campaign in 1958. Finally the various M.F.U. fixed treatment centres have continued to give treatment to cases of yaws attending. Some details of these different measures are provided below:-

Polyvalent surveys or ad hoc  
for sleeping sickness

	<u>Persons examined</u>	<u>Yaws cases</u>		<u>Incidence %</u>	
		<u>Inf.</u>	<u>Non-inf.</u>	<u>Inf.</u>	<u>Total</u>
Ashanti/Brong Ahafo	8,316	6	40	0.07	.55
North East Northern Ghana	78,977	216	548	0.27	1
North West Northern Ghana	49,160	27	149	0.05	.3
South East	30,471	974	2,276	3.2	10.5
	<u>166,924</u>	<u>1,223</u>	<u>3,013</u>	<u>.73</u>	<u>2.5</u>

Resurveys in non-Plan Ops area

Navrongo	21,782	18	38	.17	.36
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Cases treated on bilharziasis  
surveys

Ashanti/Brong Ahafo	.	14	1
Volta Region	.	128	1
Northern Ghana	.	16	2

Cases treated at fixed centres

Ashanti/Brong Ahafo	.	241	197
Volta Region	.	96	112
North East	.	62	77
North West	.	219	211
South East	.	384	213



(v) Summary and comment

In presenting reports on yaws campaigns there is a risk that the attention of even the person who might normally be expected to be interested will be lost by subjecting him to masses of tables wherein populations dealt with run into millions. The reader is assured that here the presentations of numbers has been curtailed as far as practicable and a picture is presented of the wood as a whole rather than drawing attention to particular trees.

Every quarter M.F.U. presents a report to WHO and Unicef on the progress of the yaws campaign in which numbers play an important part in describing the work done during the last three months; but these numbers are only a means to an end which is a fair and broad appreciation of a campaigns progress, they are not an end in themselves.

To summarise the work against yaws performed by M.F.U. in 1959

Yaws campaign - the recognised I.T.S. and resurveys

Examinations made	1,652,020
Cases of infectious yaws found and treated	4,701
Other cases of yaws	45,214

Post campaign activity - long term surveillance

Examinations made	38,412
Cases of infectious yaws found and treated	153
Other cases of yaws	632

Other means of yaws control - on polyvalent  
surveys etc.

Examinations made in the field	188,706
Total of infectious cases found including centres	2,401
Other cases of yaws	3,865

It is only necessary to re-emphasise here two points which have already been made, firstly the need to clarify the position with the international bodies regarding the stage when a yaws campaign in a Region is to be regarded as completed and the second is the introduction of a policy of long term surveillance to be conducted and continued by the field organisation (M.F.U.) which carried out the mass campaign.





### 3. Onchocerciasis

#### (i) Survey work

Since 1951 M.F.U. polyvalent teams operating in the field, mainly in Northern Ghana, Ashanti/Brong Ahafo and to some extent in the Volta Region, have made investigations into the distribution of onchocerciasis. These investigations have been:

- (a) Examination of a single skin snip preparation for the presence of microfilaria; since the skin is taken from the calf it is assumed that microfilaria present are those of o.volvulus. Skin snips are taken from a sample of the population.
- (b) Examination of all persons for the presence of onchocerca nodules. This examination when carried out by a field team may have its limitations but the information gained is certainly useful.

In addition cases of "blindness" are recorded.

During recent years field work in M.F.U. has been more and more ad hoc in nature; teams have been formed to deal with yaws, trypanosomiasis, to investigate bilharziasis distribution or to carry out smallpox vaccination and the old polyvalent surveys are less frequently encountered. Since no ad hoc investigations have yet been undertaken on a large scale to look into onchocerciasis distribution the survey work in this field is less every year. The records of 1959 are given:-

	<u>Population</u> <u>examined</u>	<u>Nodules</u>		<u>Skin snip</u>			<u>Blind</u>	
		<u>No.</u>	<u>%</u>	<u>±</u>	<u>=</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Ashanti Unit	.	.	.	.	.	.	.	.
N.E. Unit	32,420	238	.7	511	1,682	23	83	.3
N.W. Unit	49,664	256	.5	1,774	7,411	1.9	253	.5
S.E. Unit	30,471	384	1.3	1,747	11,535	13	18	.06
Volta Region	.	.	.	.	.	.	.	.
	<u>112,555</u>	<u>878</u>	<u>.8</u>	<u>4,032</u>	<u>20,628</u>	<u>16</u>	<u>354</u>	<u>.3</u>



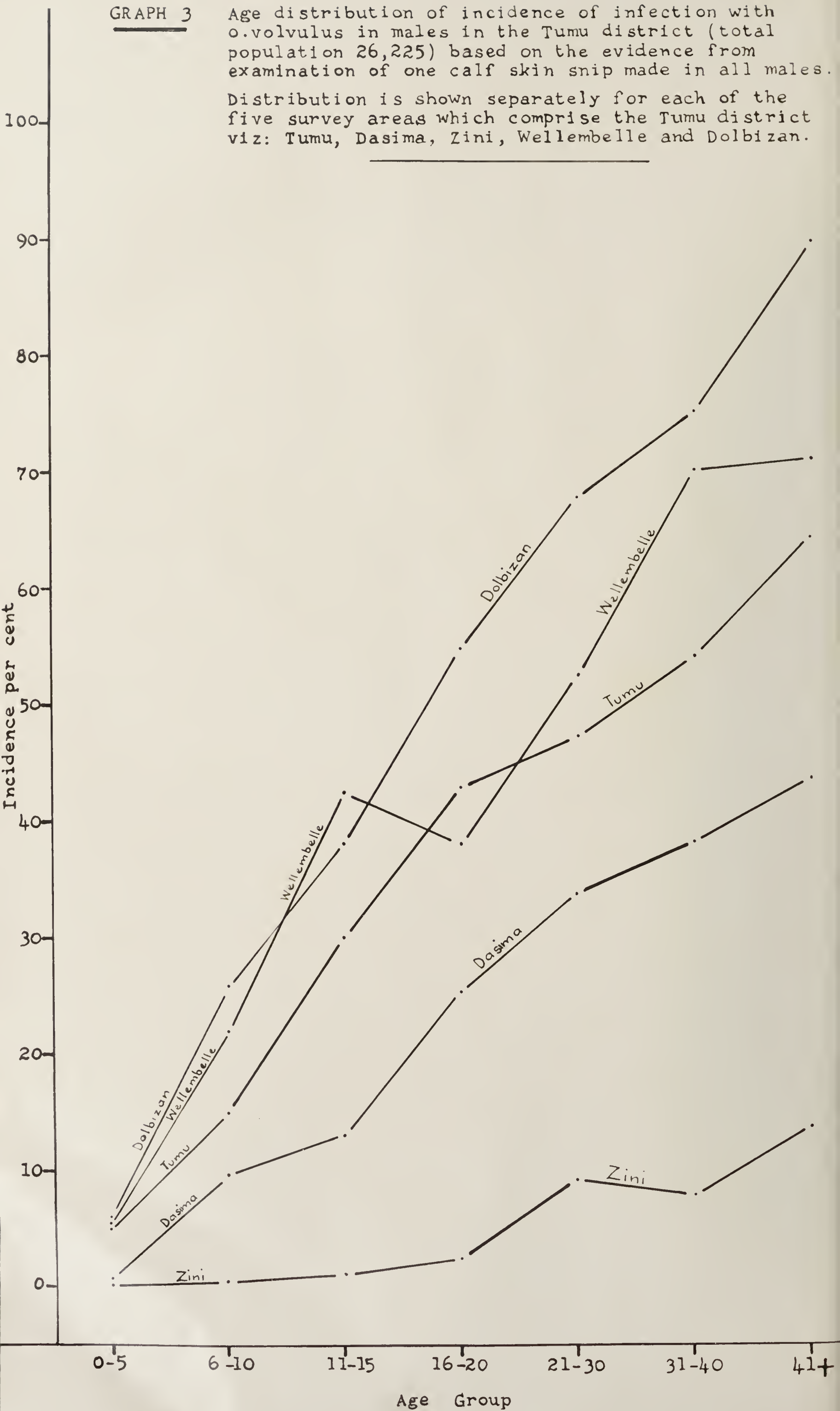




GRAPH 3

Age distribution of incidence of infection with *O. volvulus* in males in the Tumu district (total population 26,225) based on the evidence from examination of one calf skin snip made in all males.

Distribution is shown separately for each of the five survey areas which comprise the Tumu district viz: Tumu, Dasima, Zini, Wellembele and Dolbizan.



Attention is now being given in the Epidemiological Division of M.F.U. headquarters to sorting out the information collected on the distribution of onchocerciasis, based on the evidence of a single skin snip. These examinations, made since 1951, have related to a sample of the population, generally adults, but in the North West, in Tumu and Lawra districts, in the surveys made between 1954 and 1958 a skin snip was examined from everyone with few exceptions. Analysis of the age and sex distribution of infection in Tumu district (population 23,471) is given in Graph III opposite. It will be seen that, as might be expected, the incidence of infection rises with age for the longer a person lives in an infected area the greater the risks of infection.

In view of this very clear cut finding it has been decided to base distribution maps of o.volvulus infection in Ghana on the incidence found in males of 21 and over. Detailed maps of each survey area are being made and these will be compiled into maps of a smaller scale. This, of course, will take great deal of time, the Epidemiological Division is already heavily committed in many different ways. Not only is time and training required to produce detailed maps of numerous diseases but working space is also very essential to allow the maps to be hung.

So far a map is in preparation for the North West of Northern Ghana and a miniature copy of this is given in Map 8 opposite page 67.

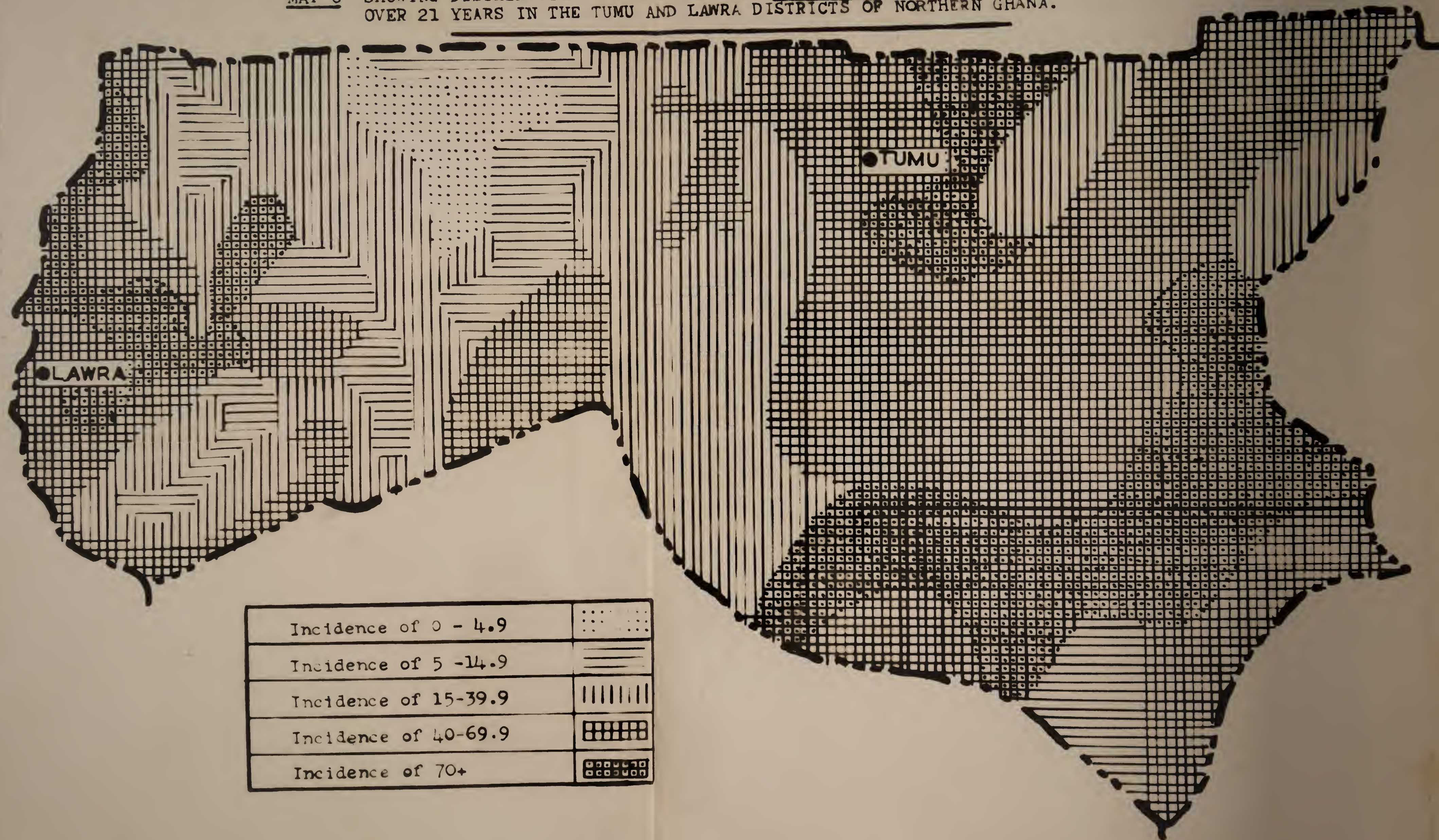
There are many problems relating to onchocerciasis which require investigation and elucidation before we are in a position to understand the disease. Much of this work is of a scientific nature and the onchocerciasis unit of the West Africa Medical Research Council which will shortly open in Bolgatanga will, no doubt, tackle many of these problems. One of the important issues for investigation is the relationship between infection and disability; by general usage a person infected with o.volvulus is regarded as "having onchocerciasis" though he may not be a "case" i.e. he may have no apparent disability. There is a need to clarify terminology. It may seem to be somewhat pedantic but it might be useful to try to draw a line between infection and disease in view of the very wide range of the consequences of infection in so many parasitic diseases (including that of o.volvulus) from a stage where the person may suffer







MAP 8 SHOWING DISTRIBUTION AND INCIDENCE OF O.VOLVULUS INFECTION IN ADULT MALES  
OVER 21 YEARS IN THE TUMU AND LAWRA DISTRICTS OF NORTHERN GHANA.





little or no effect at any time to the stage where the person may be utterly disabled for the rest of his life. It certainly seems to be desirable to make a distinction when providing reports for the public. The statement that there is 20% onchocerciasis in Ashanti and 60% in Tumu district conveys the impression that the difference between the two areas is one of numbers only whereas of course the most important difference is in the severity of the infection in the individual persons harbouring o.volvulus in the two districts.

In disease investigation (as distinct from disease control) M.F.U. can be most usefully employed where clear cut answers to investigations are available e.g. "infected" or "not infected", and since very large populations can be covered by the survey teams a very broad picture on simple issues is obtained. The research worker, on the other hand may provide a detailed picture within a small area. In onchocerciasis the role of M.F.U. is thus to present a distribution map of o.volvulus infection in Ghana as a whole and in particular in the areas which are most severely affected by onchocerciasis. At the same time it is also our duty to gather such other elementary epidemiological impressions that field workers are in a position to obtain and to investigate these as far as possible. We are in a position to investigate the influence of location on incidence, the effect of age, sex and possibly tribal origin on the pattern of the distribution of infection, much of this could be obtained from records made already. But we are probably not in a position to investigate the clinical effects of the infection apart perhaps from making sample surveys into the simpler manifestations, and we are certainly not in a position to enter the ophthalmological field. Drug trials might be considered possible but this depends very much on the availability of Medical Officers.



(ii) Control measures

No mass control of this infection is at present carried out in Ghana. In 1955 several thousands of persons infected with O. volvulus in two areas of Northern Ghana, near Nangodi in the east and in Tumu in the west, were given a course of antrypol. There is little doubt that many persons benefited from this treatment but unfortunately we were unable to continue to give this work the close supervision that it required in view of the serious nature of the side reactions and the scheme was not expanded. The effect this mass treatment had on the reservoir of infection in man was probably limited; some 500 persons were followed up on several occasions over a period of nearly 2 years and we did not get the impression that any great inroad had been made into the reservoir of infection as a whole. The subject has been fully dealt with in previous annual Reports.

Vector control has not been carried out so far on a large scale, the Simulium Control Unit is engaged in making investigations in this field and these are reported on below.

Work of the Simulium Control Unit

In 1959 a new larvicide, Didimac 25, was used on an experimental basis for the first time. In previous years two preparations had been tried, firstly D.D.T. in fuel oil and later a mixture of D.D.T. and clay but with both serious limitations had been encountered in practice. D.D.T. in fuel oil had a limited range in rivers, probably between 10-20 miles whereas the D.D.T. clay mixture is difficult and costly to prepare and too bulky to carry conveniently to dosing points.

The advantages of Didimac 25 are:-

- (1) it could be readily obtained in quantity and cost no more than the clay/DDT;
- (2) it did not require all the elaborate, time-consuming preparation necessary for the clay/DDT;
- (3) it was more readily miscible with the water;
- (4) it was less bulky and so more easily transportable;
- (5) the exact amount required for each dosing was more easily measured.



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(59) The fifty-ninth condition for each factor is low.

(60) The sixtieth condition for each factor is low.

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(67) The sixty-seventh condition for each factor is low.

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(69) The sixty-ninth condition for each factor is low.

(70) The seventieth condition for each factor is low.

(71) The seventy-first condition for each factor is low.

(72) The seventy-second condition for each factor is low.

(73) The seventy-third condition for each factor is low.

(74) The seventy-fourth condition for each factor is low.

(75) The seventy-fifth condition for each factor is low.

(76) The seventy-sixth condition for each factor is low.

(77) The seventy-seventh condition for each factor is low.

(78) The seventy-eighth condition for each factor is low.

(79) The seventy-ninth condition for each factor is low.

(80) The eightieth condition for each factor is low.

(81) The eighty-first condition for each factor is low.

(82) The eighty-second condition for each factor is low.

(83) The eighty-third condition for each factor is low.

(84) The eighty-fourth condition for each factor is low.

(85) The eighty-fifth condition for each factor is low.

(86) The eighty-sixth condition for each factor is low.

(87) The eighty-seventh condition for each factor is low.

(88) The eighty-eighth condition for each factor is low.

(89) The eighty-ninth condition for each factor is low.

(90) The ninetieth condition for each factor is low.

(91) The ninety-first condition for each factor is low.

(92) The ninety-second condition for each factor is low.

(93) The ninety-third condition for each factor is low.

(94) The ninety-fourth condition for each factor is low.

(95) The ninety-fifth condition for each factor is low.

(96) The ninety-sixth condition for each factor is low.

(97) The ninety-seventh condition for each factor is low.

(98) The ninety-eighth condition for each factor is low.

(99) The ninety-ninth condition for each factor is low.

(100) The hundredth condition for each factor is low.

For optimum effect the insecticide should be applied to the water in 30 minutes. With Didimac this presents no difficulty since it can be mixed with water in any proportion to give a quantity of insecticide that can be readily added to the river in the required time.

The initial trial of Didimac was on the Black Volta on February 5th, it was applied at Ouessa bridge over a period of 30 minutes to give a dosage of 0.1. p.p.m. On the 6th of February when the breeding sites were visited, Kamba Mouth, 30 miles south of Ouessa, was completely devoid of larvae, except for one place where three fully matured specimens were found. At Mombello, 40 miles south of Ouessa, there was no change but on the 7th of February only two larvae, both final instar, were found there and pupae were plentiful. The second treatment took place on the 10th of February with the same concentration of insecticide. By this time early instar larvae had become plentiful at Kamba Mouth and Mombello and most pupae had hatched out. On the afternoon of 11th no larvae were found at Kamba Mouth but at Mombello there was no change until the following morning when the larvae had disappeared there as well. Trials with a smaller dosage of 0.075 p.p.m. were almost as effective.

It certainly appeared that Didimac 25 merited much greater trials and these were planned for the Sissilli and Kamba during the wet season. It is inevitable that difficulties will be encountered and this year the Simulium Control Unit met its full measure, bridges down, rivers either completely flooded which precluded any trial or so low that there was insufficient current to carry the larvicide. When eventually trials could be satisfactorily made on the Sissilli (near Nakong) it became quite obvious from the catches of s.damnorum being made and recorded by the fly boys in the locality that there were other important breeding sites near at hand in addition to those being controlled on the Sissilli. It was suggested that the Kanyanbia river which runs farther south and west was responsible. Much interesting ( and hard) work was carried out in these investigations. This experience does emphasise once again the major problem confronting those undertaking s.damnorum control in Northern Ghana. It is this, there are many thousands of miles of rivers and streams in the Region which, like the Sissilli and Kanyanbia, may only be seasonal but are, nevertheless, able to breed masses of fly.





The surveys which have been carried out for suitable breeding sites cannot possibly have covered all the rivers during breeding time. Perhaps not more than 5% of breeding sites are known. Because of these difficulties in vector control an attractive idea would be to limit activity to a few selected places such as M.F.U.s action in dealing with certain village dams in the North West. But this may be a far greater undertaking than just applying Didimac at one or two points of a major stream. At Nakong in spite of the fact that *simulium* breeding appeared to have been controlled over a considerable length of the Sissilli fly counts in the neighbourhood were maintained, presumably due to invasion from streams up to 5 to 10 miles away.

The Kamba dosings took place in the mid rains, the river had been flowing intermittently during the early rains. There was not sufficient water to do control and when the river stopped flowing all *s.damnorum* early stages were destroyed. Not until about the middle of August was there a steady flow of water which allowed breeding to start on a reasonable scale at Lissa and Holli. On the 22nd of August the river was dosed at Lissa with Didimac at concentration of 0.1 p.p.m.

Heavy rains soon afterwards caused the river to flood excessively and control had to be temporarily suspended. At the beginning of October the river started to reduce very quickly by as much as 5 inches a day and dosing was commenced again at Lissa on 13th of October. This treatment and the following one on the 20th of October were 100% successful at Lissa and Holli. The treatment after that on the 27th of October eradicated all larvae at Lissa but those at Holli were unaffected. There was, by this time an insufficient flow of water between the weirs to carry the insecticide downstream and from then on Lissa and Holli had to be treated individually until the river dried up completely.

At Holli breeding continued very strongly until the end.

The Black Volta breeds fly principally in the dry season and as November came round plans to start dosing again were made. The first treatment was carried out on the 9th November using Didimac at a concentration of 0.1 p.p.m. Observation at Mombello late the following day showed a reduction in numbers of *simulium* larvae but this was not, for some reason, 100% as expected.

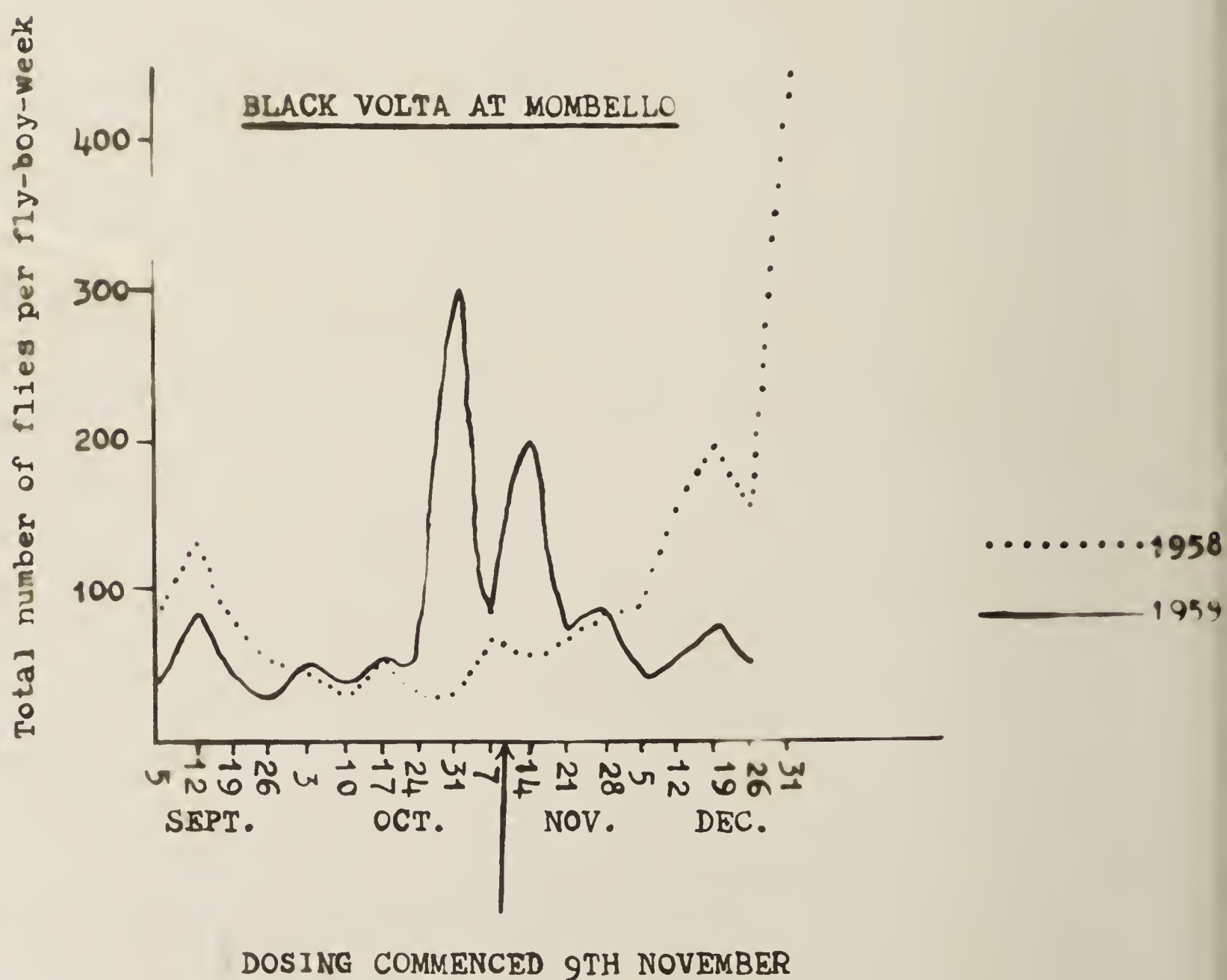






GRAPH 4

Showing the effect of continued weekly treatment of the Black Volta river with didimac 25 at Ouessa Bridge on the number of S.damnorum caught at Mombello (40 miles downstream). Treatment commenced in November 1959. Compared with counts of fly made at the same place the year before.



The dosing was carried out at weekly intervals. For the second and third application the concentration was increased to 0.15 p.p.m. which gave complete control. After that the concentration was gradually reduced again to 0.1 p.p.m. which is proving adequate.

The fly counts for Mombello and Kamba Mouth are recorded on Graph IV (opposite) along with those for 1958, Remembering that the fly counts this year started to rise several weeks before the corresponding rise seen in 1958, because of an earlier and more rapid fall in river level, the effect of the dosing is very clearly exemplified. Just after dosing was commenced fly counts, instead of continuing their upward trend show a marked and significant reduction.

Towards the end of the year trials were also made on the Morago and Red Volta to compare the effects of Didimac and a 10% solution of D.D.T. in fuel oil but as this was planned rather rapidly difficulties were met which prevented a comparison being made.

The control of the following spillways was continued during the year at

- (1) Tumu
- (2) Karni
- (3) Tizza
- (4) Turi Kalsara.

In the past the Fisheries Department using the clay/DDT. mixture found that the flow of water over the spillways did not vary a great deal from week to week and calculated an amount of insecticide which would conveniently control the simulum for each spillway. These figures were used as a guide in determining the amount of Didimac which should be used, and in all cases this was sufficient to eradicate completely the larvae at each treatment.





(iii) Problems in control

The approach to the problem of the control of s.damnsum in Northern Ghana is divided into two very distinct phases during the course of the year. In the wet season fly are very numerous, the valleys of the Sissilli, Kulpawn, Kanyanbia, Kamba and presumably many of the other seasonal rivers and streams may teem with them and breeding is obviously very widespread though we have no very exact idea of how extensive this is. Some of the major breeding points on the larger rivers at places which are reasonably accessible are known but there must be thousands of miles of seasonably running water which cannot possibly be surveyed for breeding and therefore it cannot be known how important those unsurveyed stretches are. By the time that the dry season is well advanced breeding of s.damnsum is very strictly limited to the few remaining running rivers, in the North West this is on the Black Volta. Dry season distribution of the fly appears to be mainly along the rivers, that is to say adult flies are caught readily near its banks. If we look at the records of fly counts made by single fly boys at Sissilli bridge and at Nakong (5 miles away) it will be seen that flies are very numerous during the rains May - October and are apparently absent in the dry season; see below.

	<u>Nakong</u>	<u>Sissilli bridge</u>
January	0	0
February	0	0
March	0	0
April	0	0
May	13	583
June	2,586	3,295
July	1,595	2,620
August	2,335	3,264
September	1,751	2,622
October	550	652
November	0	4
December	0	0

Now, can it be assumed that because no flies are caught during the dry season in the neighbourhood of rivers and streams which run only in the rains that all simulum have either died or retreated from these localities, where they were recently so numerous, in the face of the advancing dry weather? If this could be assumed then it would have an important effect on control policy. Under these circumstances where the dry season focus of survival was along a single river, as on the Black Volta for the whole of North West of Northern Ghana an all out dry season attack here might make heavy inroads into the surviving fly population and have a considerable effect on the ensuing wet season distribution; repeated over several seasons this could be disastrous for the fly. Unfortunately





this is not what happens, although collections made by fly boys during the dry season at places such as the Sissilli bridge would appear to indicate that fly hardly survive there at all between December and April the picture is in fact really quite different. There is strong evidence to show that although the fly appears to be absent during the dry season from the neighbourhood of the seasonal rivers and streams, it must exist there in some form in great numbers. At Sissilli bridge no flies had been caught for  $4\frac{1}{2}$  months when the first rain of the year fell in a storm in the night of 16th May. The Sissilli started to flow about 2.30 p.m. the next day. For the first time that year a few flies were caught on the 18th but in the morning of the 19th 106 were caught by the fly boy between 8 a.m. and 10 a.m.

Where had these flies come from? It is estimated that the nearest breeding site and also the apparent dry season habitat was on the Black Volta well over 100 miles away. The simplest answer, of course, is to accept that s.damnorum aestivates from one wet season to another in the immediate locality of the temporary streams and re-appears as soon as conditions are suitable for breeding and the rivers running. Dr. Waddy recounted how the fly re-appeared on the Red Volta in large numbers on one occasion a few hours before the first storm of the year broke, presumably they were influenced by the rising humidity of the atmosphere.

106 flies caught at a single point on the Sissilli river in 2 hours must indicate that thousands of fly were emerging from "hibernation" along the Sissilli alone.

It is extremely important for research workers to find the type of habitat in which s.damnorum survives the dry season. At the moment our means of attack on the fly is at the breeding sites at a time of the year when conditions for the fly are best and although the results may appear to be fair it is obvious that fly populations under such conditions soon make good the losses inflicted once control measures are lifted. What is required is an attack to be made during the dry season when the life of fly population is tenuous and the destruction of a relatively few s.damnorum would be equal to the destruction of many times that number in the wet season. The analogy with the control of tsetse is obvious, no one but a novice would undertake massive control measures against G.palpalis in the rains. The ultimate aim, therefore, might be a dry season attack on s.damnorum on the foci of its survival.





#### 4. Bilharziasis

##### Survey and investigation

In 1959 we began ad hoc surveys for urinary schistosomiasis in the North East and North West of Northern Ghana, in the Volta Region and, to a smaller extent, in Brong Ahafo - see Map 3 facing page 23. Each team comprises four men. Examinations are made only in boys of age 5-15, this group provides the highest incidence in any population and is, moreover, convenient to marshal and examine. As far as possible the examinations are made at schools but where these do not exist the boys are collected in the village. Each community in the Regions will be visited. Where there are less than 10 boys in the age group 5-15 no examination is carried out; the aim is to examine 100 wherever possible, examination of more than this number in a community is unnecessary. The procedures are standardised and it is hoped that the findings will enable a comprehensive distribution map to be made ultimately for the whole of Ghana. In the Volta Region the early stages of the work are being made in those localities which would lie adjacent to the Volta lake when the new Volta dam is built. The distribution of S.haematobium infection is already known in broad outline in Ghana as a result of work carried out previously by M.F.U. - investigations for this infection have been made on polyvalent surveys since 1952 - by Dr. McCullough and numerous Medical Officers. The aim of the present investigation is to provide a comprehensive and detailed distribution map which will be of considerable value in aiding epidemiological studies. Staff of Dr. McCullough's (WHO) unit are being attached to the medical unit survey teams and the information they collect regarding distribution of bilharzia vectors will ultimately be considered in conjunction with the disease distribution maps.

The infection with S.mansoni is less common. Investigations into its distribution are more difficult but it is hoped that these can shortly be undertaken; country wide examinations cannot be made; they will be limited to a few selected areas.



The results of the surveys made in 1959 are given.

<u>Region</u>	<u>District</u>	<u>M.F.U. census population</u>	<u>Boys examined</u>	<u>% with S.haemato- bium</u>
N.E. Northern Ghana	S. Mamprussi	29,410	3,324	4.4
	Frafra	87,692	7,249	58.0
	Navrongo	12,367	1,279	47.0
N.W. Northern Ghana	Wa	100,000	10,845	13.1
Volta Region	Krachi	33,986	3,960	1.1
	Ho	78,715	6,623	3.2
Brong Ahafo	Wenchi	10,399	753	2.8
		<u>352,569</u>	<u>34,033</u>	<u>19.6</u>

At a rough guess 20% of the population in Ghana, that is one million persons, are, or have been at some time, infected with S.haematobium. This figure was given to the W.H.O. bilharziasis advisory team during 1959 and it is not, of course, based on the figures given above which so strangely coincide. On the face of it control of this disease is necessary and if control were simple and relatively inexpensive it would have been undertaken years ago; but it is not. Comprehensive control would doubtless work out very costly. Whilst the economics are being considered attention should also be given to investigating the effect that the disease has on a population. Does it kill? Most doctors would say that in this country it does not but Professor Edington suggests very strongly that the sequelae of infection are often fatal. What effect does it have economically on a population? Most people will make a guess but it will probably only be a guess. It should not be beyond the bounds of research organisations to look into this. In the meantime in its own way M.F.U. is carrying out simple investigations into the possible effects of infection. Edington considers that one of the sequelae of infection with S.haematobium is hypertension which may lead to cardiac or renal failure. In M.F.U. we are selecting out in each Region two localities, the first where bilharziasis is prevalent, the second where it is absent or only very lightly endemic. Blood pressure readings are being taken from a large number of adult





males and these will be compared in the two areas. Examinations are not made for bilharziasis, the point of the investigation is to compare two populations in respect of blood pressure where it is known that their experience of bilharziasis is widely different.

No control of bilharziasis is carried out. The Snail Control Unit (perhaps analogous to the Tsetse Control and Simulium Control Units) is in fact concerned for the time being with investigations into the bionomics and distribution and other matters relating to the vectors and possible vectors. Whilst large and costly measures of control are being considered, and they will certainly be required in some form, it is very necessary to ensure that no large scale man made opportunities for transmission are countenanced; dams have appeared in many different parts of the country in recent years, some of these are fenced, many are not.

## 5. Guinea worm infection

### Survey and investigation

The polyvalent teams continue to examine populations for guinea worm. During recent years considerable data has accrued on this subject in the Epidemiological Division. Some distribution maps have been prepared and, in general, the bad areas of the country particularly in the North and in Ashanti/Brong Ahafo are known and on occasion use has been made of this information by the Department of Rural Water Development in guiding their policy of well sinking; but this has unfortunately not been frequent.

Guinea worm infection in a community shows very great seasonal variations and as our surveys are continued throughout the year the records for different localities can hardly be strictly compared. The survey findings in 1959 are given below.

	<u>Population examined</u>	<u>Cases</u>	<u>Incidence %</u>
North East Northern Ghana	71,642	581	0.81
North West Northern Ghana	49,639	218	0.44
Volta Region	3,314	1	.03
South East	30,471	.	.
	<u>155,066</u>	<u>800</u>	<u>.5</u>

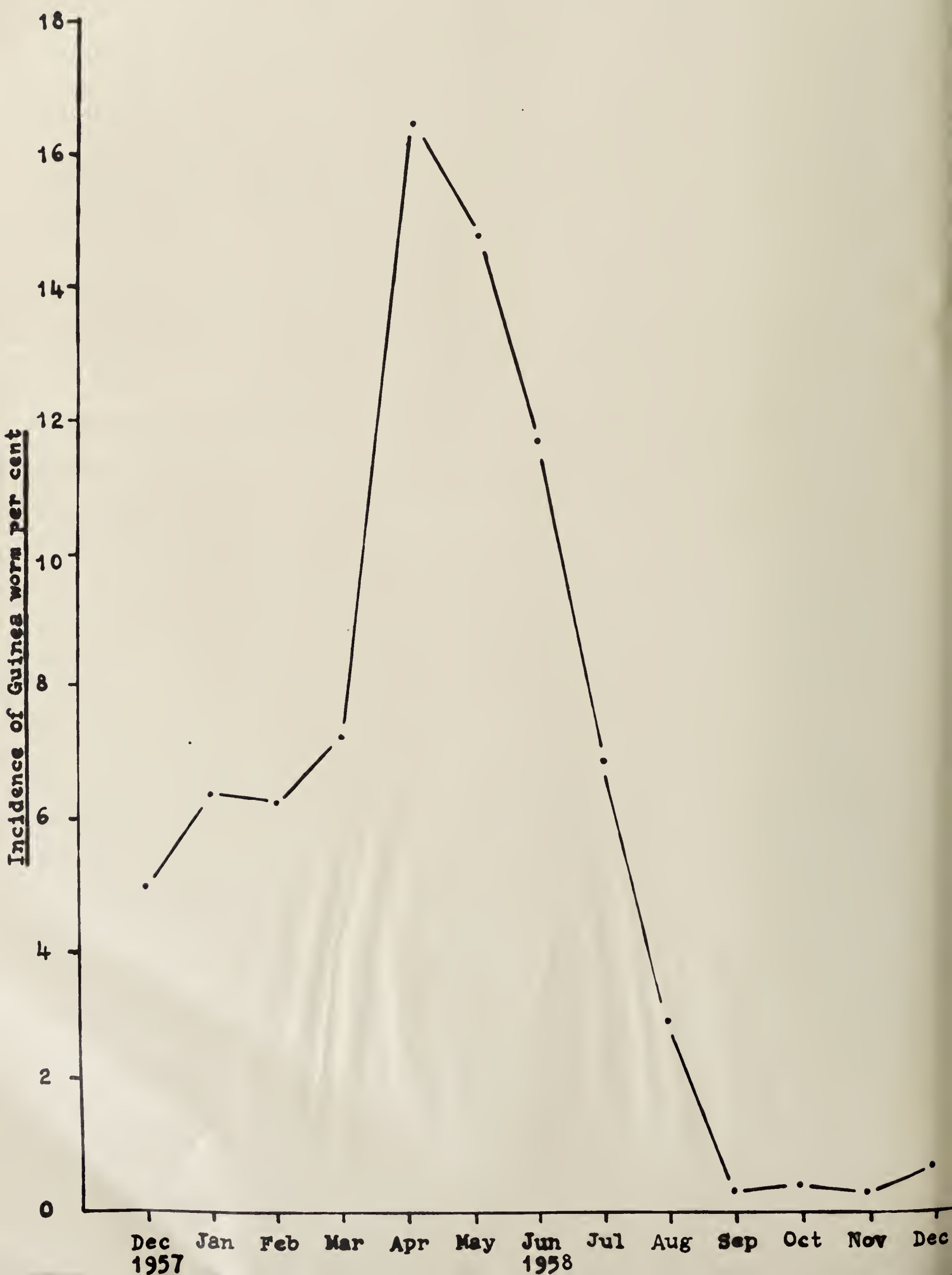






**GRAPH 5**

Showing the monthly variations in the incidence of guinea worm infection throughout 13 months on a population of 878 persons in three neighbouring villages in North West Brong-Ahafo.



As with other infections a table so compressed as this may completely mask important features of the distribution. But it does show that in the Dawa area of the Eastern Region where a polyvalent survey was made there is no problem and in fact no serious focus of the disease was encountered during the year anywhere.

In 1959 some epidemiological investigations into the disease in part of North West Brong Ahafo where the infection is particularly prevalent were completed and assessed. Three villages had been selected, and examination of the population for evidence of guinea worm was made at the same time in every month throughout a whole year. Of 878 persons living in these three neighbouring villages 218 or 24.8% were infected with guinea worm at some time during the year; but there is a great variation of the incidence from month to month providing an annual cycle which is shown in Graph V opposite and in the table below. The incidence in the whole population ranged from 16.5% in April to 0.25% in November.

Incidence of guinea worm infection percent

	<u>Whole population</u>	<u>Women (Females 16+)</u>	<u>Men (Males 16+)</u>	<u>Boys</u>	<u>Girls</u>
December	4.9	8.5	5.1	1.7	2.8
January	6.3	8.2	6.5	4.6	5.2
February	6.2	7.9	7.6	4.5	3.6
March	7.2	9.0	8.0	5.1	6.2
April	16.5	20.8	18.0	14.4	10.4
May	14.8	16.2	15.1	16.3	10.7
June	11.7	15.2	9.4	10.0	11.1
July	6.9	9.7	5.3	5.9	5.9
August	2.9	4.3	3.3	2.0	1.3
September	.3	.5	0	0	.7
October	.4	0	0	0	1.9
November	.25	4	0	0	.6
December	.73	2.1	0	0	.6

It is not difficult to explain a seasonal variation. At the end of the dry season the population are dependant on a few ponds and contact between open cases and sources of drinking water is greatest; as the rains increase villages are less dependant on these ponds which in any





event increase in size and are thus less dangerous. The timing of the maximum and minimum incidences of the disease to occur at the end of the dry season and in late rains is not due to the facts mentioned above but is a result of the incubation period of the infection being almost exactly one year. Thus the period of greatest transmission, April or end of the dry season, is followed one year later by the appearance of the maximum number of cases. Periodicity of climatic conditions and the length of the incubation period thus together make the cycle of the disease incidence more emphatic.

The impression has very often been gained that among persons living under the same conditions where guinea worm infection is particularly common some of the people appear to have the infection with great regularity every year whilst a few, at the other end of the scale, seem to be completely resistant. During the monthly surveys in the three neighbouring villages an attempt was made to obtain an accurate history about past infections from each person and this, together with the evidence of the examinations made during the surveys showed quite clearly that about 20% of the population were able to resist infection completely; by the time the people in the community have reached the age of 15 about 80% of them have been infected at some time, 20% have remained free. Thereafter there is little change in the pattern. Of 60 people over 41 years of age who were followed throughout the year 44 had previously had guinea worm and of these 15 (or 33%) were reinfected whilst under observation; of the 16 in this age group who had so far escaped the disease only 1 (or 6%) succumbed during the same period. Whilst it is possible on this evidence alone to say that some persons are much more resistant than others to guinea worm the question of particular susceptibility could not be investigated since a history of severity and frequency of attack is much less reliable than an answer to the question enquiring whether or not a person has ever had guinea worm.

Investigations into the possible reasons for variation in resistance led us to a series of fractional gastric analyses on volunteers some of whom were particularly liable to infection others who resisted it. The results of these have shown that susceptibility or resistance to guinea worm infection is determined by gastric acidity; a high hydrochloric acid content particularly when this is maintained (after the test meal) appears to protect, whereas persons with little free acid are liable to infection. Presumably the high gastric acidity protects by the destruction of the larvae as they escape from the cyclops.





## C. Leprosy

### (i) Survey

This disease is diagnosed and recorded by the polyvalent surveys. In 1959 the field findings were:-

<u>Unit</u>	<u>Population</u>	<u>Cases</u>	<u>Incidence %</u>
North East Northern Ghana	71,642	872	1.2
North West Northern Ghana	49,664	243	.5
Brong Ahafo	8,316	50	.6 Ejura area
Volta Region	3,314	27	.8 Banda
South East	<u>30,471</u>	<u>263</u>	<u>.9</u>
	<u>163,407</u>	<u>1,455</u>	<u>.9</u>

Many of the cases found are, of course, already taking treatment at the clinics of the Leprosy Service which are widely distributed throughout Ghana. As a general rule cases are advised by a member of the M.F.U. team to attend the nearest of these treatment posts if they are not already doing so.

### (ii) Control

M.F.U. does not undertake the mass control of leprosy, this is carried out by the Leprosy Service but a small contribution is made in this field in the four leprosy treatment centres which are run by the Ashanti/Brong Ahafo Unit in Kumasi, Yeji, Ejura and Kintampo; the latter with 3 daughter clinics in the neighbourhood. The number of cases treated in 1959 was 1,162. A good impression of the trend of events in these clinics is given by the centre in Kintampo:-

Patients under treatment at the beginning of the year	83
Admitted during 1959	8
Discharged	29
Transferred to other clinics	3
Left	12
Died	1
Patients under treatment at the end of the year	45

The real decrease in numbers due to discharge of patients to follow up and regarded as cured was 21. Of the 8 new patients all were tuberculoid infections. Three were immigrants from the north and the remaining five were local people who had obviously been infected in the neighbourhood; none of them had taken treatment previously.



The Kintampo treatment centre was opened in August, 1950, there were soon over 100 patients on the register and for some years admissions far exceeded discharges so that at one period there were some 170 patients taking treatment. The tide is now certainly beginning to ebb.

The Kumasi treatment centre is particularly discouraging to run; the turn over of patients is very great, attendance is irregular and it is impossible to do any sort of follow up as can be done in rural areas; defaulting patients are very difficult to find in urban communities.

## 7. Smallpox Control

There were less than 110 cases of smallpox notified in Ghana in 1959 and consequently it was not necessary for M.F.U. to be called in to set up isolation camps. Nor was it necessary during the year for teams to be formed to carry out mass vaccination campaigns conducted in the face of an epidemic. The North East Unit did employ two persons for a short time in vaccination duties only, this is indicated on Map 3 facing page 23, but this was only for the purpose of filling in vaccination gaps.

As far as possible polyvalent teams carry out vaccination against smallpox in the populations they examine and a general principle is that no opportunity should be missed to do this work. But vaccination is not generally very popular with the public, a great deal of time and effort has to be given to obtaining full support, consequently it is impossible to combine this work with the mass campaigns against yaws however attractive the idea of saving staff might appear to be; the two operations do not mix.

During 1959 the following vaccinations were carried out by the M.F.U.

<u>Unit</u>	<u>Primary vaccination</u>	<u>Revaccination</u>	<u>Total</u>
N.E. Northern Ghana	24,599	17,604	42,203
N.W. Northern Ghana	17,137	26,359	43,496
Ash./Brong Ahafo	.	.	.
Volta Region	.	.	.
South East	14,511	14,704	29,215
	<u>56,247</u>	<u>58,667</u>	<u>114,914</u>





This is a 50% increase over last year.

During the year we have gone over to the use of Lister dried vaccine which is far more effective for bush work than the lymph variety which loses its potency so rapidly. There is no doubt from the routine follow up examinations which are made on some of the primary vaccinations that this vaccine is extremely effective. Supplies during the year have been adequate.

In preparation for a W.H.O. assisted mass vaccination campaign which may be launched in Ghana in 1960 the Epidemiological Division has prepared maps showing where this organisation has carried out vaccination work since 1956 giving separately total and vaccinated populations.

#### 8. Cerebrospinal meningitis

In 1959 M.F.U. were called in to provide camps and deal with an outbreak of C.S.M. in the North East of Northern Ghana. The area principally affected was Navrongo, many cases also occurred in Kusasi but we were not called in there until the outbreak was over.

The North East Unit treated 157 cases in the various camps; there were 17 deaths (11%). The records show that from 130 patients who reported to our staff on the first or second day only one died but as from the third day onwards the death rate was about 29%.

(treatment started on 3 day	:	8 deaths from 31 patients
" " " 4 "	:	5 " " 20 "
" " " 5 "	:	3 " " 4 "
" " " 6 "	:	1 death " 3 ").

There was no predeliction for a certain age.

0-9	years of age	43 patients
10-20	" " "	44 "
21-30	" " "	46 "
31-40	" " "	30 "
over 40	" " "	9 "



The outbreak of 1959 was certainly on a less scale than that of 1958 but once again was confined to the north east and again Navrongo and Kusasi were principally affected. Not only was this epidemic repetitive of 1957 and 1958 in terms of districts involved but it was also quite remarkable how certain localities, particularly Paga in the Navrongo district, have been singled out in two or more consecutive years by a relatively heavy attack rate. For reasons that cannot be understood Frafra district is much less heavily affected than its neighbours in these annual outbreaks of recent years.

The notifications of C.S.M. in all Ghana have recently been:

1957	395
1958	786
1959	482

For the purpose of recording notifications the Ministry of Health has divided Northern Ghana into 5 districts, Wa, Gonja, Dagomba, Navrongo and Mamprussi. This latter district is in fact composed of Frafra, Kusasi and South Mamprussi. The notifications of recent years have been distributed as follows:-

<u>District</u>	<u>Census population</u> <u>approx.</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>
Wa	205,000	12	54	39
Gonja	84,000	2	4	6
Dagomba	224,000	8	12	11
Navrongo	142,000	16	488	212
Mamprussi	389,000	288	128	119
Mamprussi is made up of 3 sub-districts				
Frafra	164,000	21	128	119
Kusasi	147,000	236		
South Mamprussi	78,000	31		

This table does indicate that from 1957 to 1958 (and perhaps to 1959) there is a progression of the disease from Kusasi on the east westwards to Navrongo. A very surprising





feature is how Frafra which lies between Kusasi and Navrongo has pretty well escaped attack, only 21 in 1957 against 236 nextdoor in Kusasi and although the separate figures for Frafra are unknown for 1958 and 1959 they cannot have been anywhere near those in its western neighbours, Navrongo. If the progression westwards from Kusasi is maintained in the present cycle of C.S.M., as it was in a former cycle, then the time of the North West will surely come.

What cries out for investigation here is an epidemiological study of this disease on the spot at the time of the outbreaks. There are three very obvious questions which are raised:-

- (a) Why does the disease move gradually westwards in the course of a cycle?
- (b) Why has Frafra escaped, the infection jumping from Kusasi to Navrongo?
- (c) Why even within districts there are relatively small communities (or localities) which are subjected during the course of a cycle to particularly heavy infection rates during each season.

Dr. Waddy has explained why these epidemics occur in the dry season. He has also helped to explain periodicity of the larger cycles which occur about every 10 to 20 years. It may be that the Frafra's escape during the last 3 years lies in a slightly higher absolute humidity of the atmosphere compared with its neighbouring districts, but this requires careful investigation.

It is hoped that in future years it will be possible to provide a medical officer to make a full time study of these epidemics during their occurrence for only in this way shall we be able to come to a better understanding of the behaviour and distribution pattern of this disease.

/84.....



Summary of the work done in 1959

The work carried out by Medical Field Units in 1959 can be briefly summarised:

209,000 persons were examined for trypanosomiasis in the field.

518 cases were discovered amongst them and were given treatment.

363 other new and 208 old cases of trypanosomiasis attended our centres and itinerant teams for treatment.

1,089 is the total of the number of cases of trypanosomiasis treated.

388 persons received prophylaxis against the infection.

427 miles of stream banks were cleared or recleared in areas where trypanosomiasis is prevalent.

1,652,020 examinations were made for yaws in the Initial Treatment Survey or at resurvey in the yaws campaign. (Note in the course of a yaws campaign every person is examined on four occasions).

277,118 additional examinations were made for yaws by M.F.U. teams.

7,255 cases of infectious yaws were discovered and treated.

49,711 other cases of yaws were also diagnosed and treated.

469,313 persons received prophylaxis against yaws.

114,900 persons were vaccinated against smallpox.

1,167 persons were treated for leprosy.

157 cases of C.S.M. were treated.

34,000 boys aged 5-15 were examined on ad hoc surveys for bilharziasis in a population of 350,000.

150,000 persons were examined in the field for evidence of a number of endemic diseases.





The brief summary on page 84 provides a very simple picture of the work carried out by M.F.U. But like the Report itself it has been subjected to severe trimming.

In the 1959 Report the trend of recent years to be discursive has continued and clearly reached its peak; the preparation of this document within the space of two weeks in January, when routine work must carry on without interruption, does not allow the very careful consideration of every page which is desirable. A compromise of standards must be reached, quality gives place to speed; the introduction of detail is prohibited by the wide aims of the Report—to interest as many persons as possible. It is, indeed, this objective which has been most constantly borne in mind in writing this Report.

David Scott  
SPECIALIST EPIDEMIOLOGIST

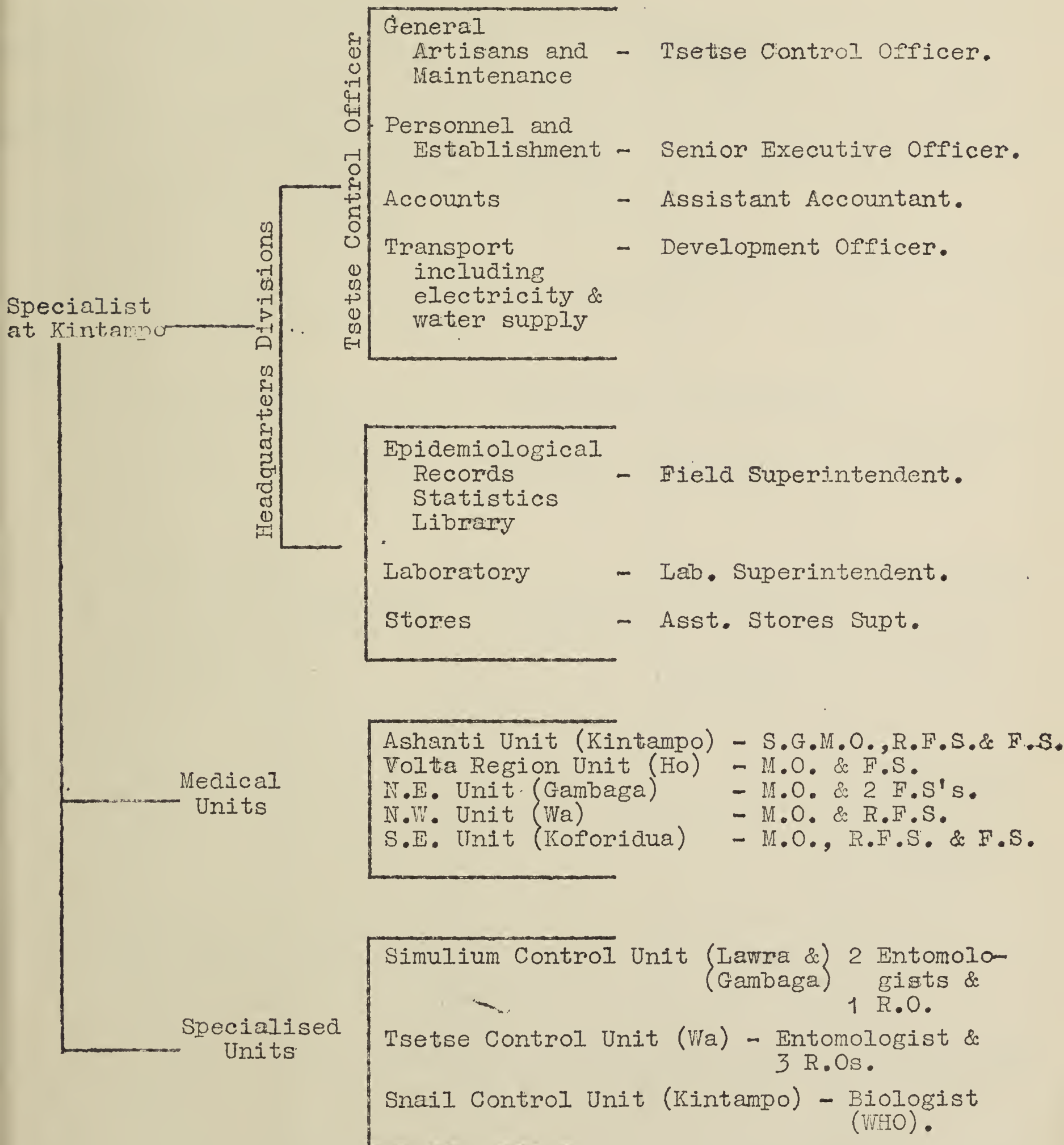
KINTAMPO

January, 1960.



## Appendix I

The individual field units and headquarters sections  
location of senior staff.



R.F.S. - Regional Field Supervisor  
 R.O. - Reclamation Officer  
 F.S. - Field Superintendent.





Appendix 2

Progress of Yaws Campaign at 31st December, 1959.

UNIT	DISTRICT	I.T.S.	RESURVEY		
			1ST	2ND	3RD
sh/B.A.	North West	Previously completed	Completed in 1959	In progress	In progress
	North East	Completed in 1959	In progress	Not started	Not started
	South West	Just started	Not started		
	South East	Not started			
olta Region	Kete-Krachi	Previously completed	Previously completed	Previously completed	Completed in 1959
	Ho		Completed in 1959	Completed in 1959	
	Keta			Completed in 1959	
.E.	S.Mamprussi	Previously completed	Previously completed	Previously completed	Previously completed
	E. Dagomba			Completed in 1959	
	W. Dagomba				
	E. Gonja				Completed in 1959
.W.	Wa	Previously completed		Previously completed	
	W. Gonja			Completed in 1959	
	Tumu				
.E.	Akwapim-New Juaben	Just started	Not started	Not started	Not started
	Volta River				
	Akim-Abuakwa				
	A. Akim				
	Kwahu				



Appendix 3Medical Field Units Senior Staff List 1959

<u>N A M E</u>	<u>P O S T</u>
Dr. D. Scott	Specialist Epidemiologist
<u>S.G. Medical Officer</u>	
Dr.F.J. Wickremasinghe	Special Grade Medical Officer
<u>Medical Officers</u>	
Dr. E. Von Haller	Medical Officer i/c. North East Unit
Dr. G.R.L. Lyons	Medical Officer i/c " " -
Dr. E. Onori	Medical Officer i/c. Volta Region Unit
Dr. F.C. Grant	Medical Officer i/c. South East Unit
Dr. L. Rosei	Medical Officer i/c. Ashanti Unit
Dr. W. Korabiewicz	Medical Officer i/c. North West Unit
<u>Entomologists</u>	
Mr. J.D. Marr	Entomologist i/c. Simulium Control Unit (West)
Mr. E.A.S. La Croix	Entomologist i/c. Tsetse Control Unit
Dr. G.K. Noamesi	Entomologist i/c. Simulium Control Unit (East)
<u>Biologist</u>	
Dr. F.S. McCullough	WHO Senior Officer i/c. Snail Control Unit
<u>Tsetse Control Officer</u>	
Mr. D. Farr	Tsetse Control Officer
<u>Regional Field Super- visors</u>	
Mr. D.B. Venkumuni	Regional Field Supervisor with Ashanti Unit
Mr. H.A. Ashong	Regional Field Supervisor with South East Unit
Mr. J. Kwaateng	Regional Field Supervisor with North West Unit
<u>Field Superintendents</u>	
Mr. E.O.K. Tay	Field Superintendent with Volta Region Unit
Mr. D.K. Ameyaw	Field Superintendent with North East Unit
Mr. K. Anowih	Field Superintendent with South East Unit
Mr. R.A. Abatey	Field Superintendent with North East Unit
Mr. D.E. Spong	Field Supt.i/c. Epidemiological Div. Headquarters
Mr. B. Aidoo	Field Superintendent with Ashanti Unit
<u>Reclamation Officers</u>	
Mr. A.C. Nyante	Reclamation Officer with Tsetse Control Unit
Mr. J.K. Odobill	Reclamation Officer with Tsetse Control Unit
Mr. S.K. Sakara	Reclamation Officer with Tsetse Control Unit
Mr. L.A. Damba	Reclamation Officer with Simulium Control Unit
<u>Development Officer</u>	
Mr. D.P.K. Quainoo	Development Officer i/c. Transport at H/Q's.
<u>Asst. Stores Supt.</u>	
Mr. J.L.Quist-Therson	Assistant Stores Supt. at Headquarters
<u>Lab. Superintendent</u>	
Mr. R.Y. Empeh	Laboratory Superintendent at Headquarters
<u>Senior Exec. Officer</u>	
Mr. S.A. Adom	Senior Executive Officer at Headquarters
<u>Assistant Accountant</u>	
Mr. J.L. Minnow	Assistant Accountant at Headquarters





Appendix 4

The distribution of junior technical staff among the  
separate Units

Unit	F.A.I		F.A.II		Est. F.T.	Unest. F.T.	Recorders	Trainees
	M.	T.	M.	T.				
Headquarters	2	1	7	2	4	-	-	-
Ashanti Unit	4	-	18	-	22	2	-	4
Volta Region	1	-	15	-	7	-	-	2
North East	6	-	16	-	21	5	-	6
North West	3	-	8	-	17	1	-	6
South East	2	-	15	-	9	1	-	1
Simulium Control	-	-	5	-	5	-	-	-
Tsetse Control	-	2	-	17	-	-	14	-
Snail Control	-	-	2	-	-	-	-	-
Others	1	-	3	-	3	-	-	-
Total	19	3	89	19	85	9	14	19



## Appendix 5

### Minor works buildings for M.F.U. in 1959.

The calendar year overlaps parts of two financial years.

In 1959 the following construction work was completed in respect of the financial year 1958/59.

<u>Station</u>	<u>Work</u>	<u>Cost</u>	<u>Remarks</u>
Lawra	4 bay garage	£500	Completed by M.F.U.
Kintampo	10,000 gallon Braithwaite water tank	£1,300	Completed by R.W.D.
Kumasi	Patients shelter at Treatment Centre	£300	Completed by P.W.D.

In 1959/60 the following work is approved.

Gambaga	Petrol store	£300	} Under construction by M.F.U.
	Improvement to Entomologist's house	£1,300	
	Tank	£800	
	4 bay garage for Tsetse Unit	£500	





Appendix 6

Medical Field Units Transport

<u>Type of vehicle</u>	<u>Government</u>	<u>Unicef</u>
5 Ton	3	-
3 Ton	6	-
2 Ton	-	1
1½ Ton (crew cars etc).	12	-
Land Rover		
Long Wheel Base	14	9
Short Wheel Base	*4	3
Volkswagon Ambulance	1	-
	—	—
	40	13
	—	—

\*Including 2 awaiting Board.













